# COMPUTERWORLD

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NEWSPAPER

## *Back in Trial Ring, Barr Comes Out Punching*

**By E. Drake Lundell Jr.**
CW Staff

NEW YORK — IBM's heavyweight attorney Thomas D. Barr returned to action here last week, apparently spoiling for a good fight because he not only took on his main adversary — the U.S. government — but also the referee, Judge David N. Edelstein, who is hearing the government's antitrust case against the firm.

Barr entered the ring again in Courtroom 110 here looking trim and fit after a few months' absence to act as the IBM attorney handling IBM witness Richard P. Case, who is presently undergoing cross-examination by government attorney John Chapman.

And while Barr got in some good blows against both Chapman and Edelstein, both the judge and the government attorney turned out to be formidable counterpunchers.

Case previously testified for 16-1/2 days as the first witness for the defense but he had been unavailable for cross-examination be-

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# Carter Quashes Sale Of System to Soviets After Sharansky Trial

**By Ann Dooley**
CW Staff

WASHINGTON, D.C. — President Jimmy Carter reacted swiftly last week to the sentencing of Soviet computer scientist Anatole Sharansky to 13 years in prison and labor camps by canceling the sale of a $6.8 million computer system to the USSR.

As one of several other moves to express U.S. condemnation of Sharansky's trial and conviction on charges of treason and anti-Soviet agitation, Carter quickly stopped the proposed sale of a Univac 1100 series system to Tass, the Soviet news agency.

Although the White House has made no formal announcement on the matter to date, Carter has ordered Commerce Secretary Juanita Kreps to reject Univac's request for the necessary export license, according to Commerce Department officials.

Responding to Carter's action, the Soviet Union said pressure on the Kremlin in trade or other areas would not be in the U.S.' interest and would lead to a "path of confrontation."

Meanwhile, at a State Department press briefing, Tom Reston, acting spokesman and assistant deputy secretary for public affairs, stated that from now on each request for approval of computer exports will be considered on its merits and that the Univac sale was canceled because of current cir-

*(Continued on Page 8)*

### *To Support Most Protocols*

# ACS Promises Wide Compatibility

**By Ronald A. Frank**
CW Staff

WASHINGTON, D.C. — Plans for AT&T's Advanced Communications Service (ACS) show the public packet-switched network will provide compatibility for most major terminal types and protocols.

AT&T has filed a petition asking the Federal Communications Commission (FCC) to issue a declaratory ruling that will clear the way for Bell to file a tariff and offer ACS as a regulated service [CW, July 17].

While many of the regulatory issues surrounding ACS remain to be considered, the operational aspects of the service will be of interest to both large and small data communications users.

### Five Terminal Classes

According to AT&T's filing with the FCC, ACS will support five terminal types, or classes. Class 1 includes devices which operate at speeds from 110- to 1,800 bit/sec in asynchronous mode. Typically these terminals use Ascii code with start/stop contention protocols.

Included are so-called "glass Teletypes" and the AT&T Dataspeed 40/1 as well as Teletype models 33, 35 and 43, an AT&T spokesman said.

Class 2 is similar to Class 1, but typically adds buffering capability to the terminals. This class includes the Dataspeed 40/2 CRT and the Hazeltine Corp. 2000.

A Class 3 terminal is an asynchronous polled device operating at 134.5 bit/sec with a polled start/stop protocol using Extended Binary Coded Decimal or paper tape code. Examples of this type of equipment are the IBM 2740 Model 2 and the Dataspeed 40/3, the spokesman said.

Class 4 devices are cluster-controlled and stand-alone synchronous polled units operating at speeds from 2,400- to 9,600 bit/sec with binary synchronous protocol. This includes the IBM 3270 CRT family and the Dataspeed 40/4.

Class 5 units are batch and remote job entry synchronous contention terminals operating from 2,400- to 9,600 bit/sec under binary synchronous protocol. Included in this category is the IBM 2780 terminal.

Both character-oriented and bit-oriented protocols will be supported, with CCITT X.25 included in the latter category. Initially, there are no plans to support the various network architectures originated by mainframe vendors

*(Continued on Page 6)*

# Hearings Begin on Communications Bill

**By Edith Holmes**
CW Washington Bureau

WASHINGTON, D.C. — Will the public interest in telecommunications really be best served by minimizing regulation of communications in favor of competition?

That is the question past and present Federal Communications Commission (FCC) chairmen and a Justice Department official debated here last week during hearings on the proposed Communications Act of 1978.

During hearings before the House Communications Subcommittee on the bill that would replace the 1934 Communications Act which, among other things, created the FCC, the current commissioners complained that the proposed legislation would weaken that regulatory body.

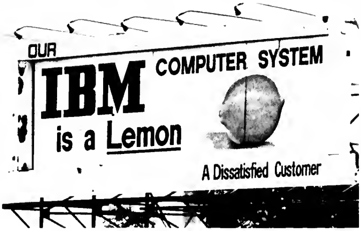
H.R. 13015 "abandons" the old law's injunction that the commission base its telecommunications decisions on the "public convenience, interest and necessity" standard, FCC Chairman Charles D. Ferris said. The bill's reliance on the commission's intervention in those instances where there are "deficiencies in marketplace forces" may not be sufficient guidance for regulation, he added.

### Justice's View

The Justice Department had a different viewpoint to offer during this first of many weeks of hearings on the proposed statute, however. "While traditional regulation may be able to remedy some industry abuses, even the most sincere and dedicated of regulators will acknowledge that traditional mechanisms are not nearly so effective in compelling established carriers to perform more efficiently and more responsively as the threat of new entry and new competition," John Shenefield, Assistant Attorney General in charge of the Antitrust Division, told the House subcommittee.

Competition can function as a valuable regulatory tool and open-entry policies can be relied on to yield sub-

*(Continued on Page 6)*



UPI Photo

### Sour on IBM

**A St. Louis, Mo., user of an IBM system has a message for IBM — and the world. IBM knows who he is, but refused to reveal his name. The firm would only say that the sign is "unfair" and that General Systems Division personnel are "working with the customer" to resolve his difficulties in a "businesslike manner."**

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# Court Rules Firms Don't Have to Bear Cost of Reprogramming in Class Actions

By Don Leavitt
CW Staff

WASHINGTON, D.C. — What might have been a thorny DP problem for U.S. firms faced with class actions suits was resolved here recently when the Supreme Court ruled a company does not have to pay for any reprogramming so a plaintiff can use the company's records to identify and send notices to members of the class.

The unanimous vote reversed the Second U.S. Circuit Court of Appeals decision on which party should pay for extracting the class members' names from the Oppenheimer Fund, Inc.'s files. The high court did not address the claims made against the firm, and the class action suit was sent back to district court for handling.

In its ruling, the Supreme Court said the appeals court had overstepped its authority in ordering Oppenheimer to bear the cost of reworking some of its records to pinpoint the members of a class as defined by plaintiff Irving Sanders.

Writing for the high court, Justice William Powell reasoned that the fund's management had set up its files in the manner it felt to be best for the fund's operation and that the fund didn't act to hide information from Sanders.

Oppenheimer "should not be penalized for not maintaining its records in the firm most convenient for some potential future litigant whose identity and perceived needs could not have been anticipated," Powell said.

The appeals court had found that the estimated $16,000 needed to rework the information in the Oppenheimer files was a "modest" amount compared with the fund's assets of more than $500 million. But that was no reason to make the fund bear the expense of furthering the plaintiff's case, Powell remarked.

Although the rules of class action suits do allow judges to make the defendent perform specific acts needed to send notices to class members "if the defendant can perform the act more efficiently than the representative plaintiffs," that condition did not apply in this case.

The records were in the hands of the fund's transfer agents and neither the plaintiff nor the fund by themselves could create the needed list. Both agreed they would have to hire the services of the transfer agent and in that case, Powell noted, the cost would be the same whether paid by the plaintiff or Oppenheimer.

### 'Frivolous' Comment

Toward the end of the opinion, Powell commented that "though it may be expensive to retrieve information stored in a computer when no program yet exists for the particular job, there is no reason to think the same information could be extracted any less expensively if the records were in a less modern form.

"Indeed," he added, "one might expect the reverse to be true, for otherwise computers would not have gained such widespread use in the storing and handling of information."

Powell branded as "frivolous" Appeals Court Judge Paul R. Hays' comment that through the use of computers "complex electronic processes may be required to extract information which might have been obtainable through a minimum effort had different systems been used."

The case against Oppenheimer alleges that Sanders, as a representative of a class — shareholders — had paid an artificially inflated price for shares of the mutual fund.

# FCC Turns Thumbs Down On Primary Instrument Bid

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — An AT&T attempt to require all private-line telephone users to get their equipment from the Bell System was defeated here recently by a unanimous vote of the Federal Communications Commission (FCC).

Called the primary instrument concept, this AT&T suggestion was viewed by some as a Trojan horse, designed to cement the Bell System's position in the American household and business with the hope of later replacing voice service with data communications services. AT&T contended other manufacturers' equipment harms its network and argued it could offer several "social benefits," including higher quality service.

In its vote, the FCC concurred with its Common Carrier Bureau's recommendation that the primary instrument concept be rejected. The bureau said it had been unable to identify any social benefit from the idea.

The FCC has already ruled that consumers must notify AT&T when they connect a non-Bell device to the telephone network, the Common Carrier Bureau pointed out. This ruling is embodied in the terminal registration program.

The bureau acknowledged that the "soft element" in its argument that the AT&T proposal be rejected is the fact that the public may not notify Bell when it plugs equipment into the network. But if there is harm to the network, the bureau reasoned, "we presume the Bell System can detect it and end the consumer's service."

The decision to reject the primary instrument concept and rely on the terminal registration program was recognized by the FCC as a compromise short of permitting AT&T to be the only equipment supplier for voice service.

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# Barr Resumes Sparring for IBM

*(Continued from Page 1)*

cause of his duties as group director of advanced systems development for IBM's Data Processing Group.

Barr spent the opening rounds in very preliminary sparring, while he objected to the definition of certain words used by government attorney Chapman, but it soon became apparent the sparring was only a warm-up for the main event.

The match eventually turned into a real old-fashioned slug fest here as Barr accused the judge of prejudice and Chapman indicated the IBM witness might be lying.

### Opening Rounds

Here is a round-by-round account by our reporter at ringside:

Courtroom 110 hardly matches Madison Square Garden, and the opponents in this fight seem unevenly matched, with IBM heavyweight Thomas Barr looking formidable with his new shorter haircut, while Chapman in the government trunks and Boston accent certainly weighs in under the bulk of Barr although he seems ready for action and fast on his feet.

Referee Edelstein is hard to judge under his black robes as the opening bell is sounded for the usually gentlemanly confrontations between the two sides. The witness Case looks like a good company man.

The scene is set, although completely ignored by the reporters and television people flocking around the courthouse step for a glimpse of the participants in the test tube baby case on another floor.

The first round is desultory at best as Case describes the jobs he held in 1966, but one quick and sharp exchange of jabs occurs when the judge tries to determine whom Case is speaking for when he uses the term "we" and Barr wades in with several jabs indicating Chapman should be more precise in how he asks his questions.

In the next round, Case has trouble recalling events and referee Edelstein admits "I have a hard time communicating" with this witness.

At almost every question, Barr jumps up for clarifications, leading to some sharp jabbing and dancing on both sides of the ring and calling for the referee to tell both sides, but particularly Barr, that he's getting tired of "each of you" and that the fighters are "trying my patience."

Case, Barr's tag team partner, suddenly has an attack of "no recollection" about getting 360/90 machines to test when he was in charge of 360 operating system development even though under direct examination he was able to recall most of the internal IBM debates prior to this point in time.

After another rather sharp exchange in which Barr accuses Chapman of "taunting" the witness and the judge tells the witness he is being "hypertechnical," the referee has to admonish Barr because "an element of coaching" was involved in his questions.

The fighters, after a number of Case "don't recalls," which he has down pat by this time, break for lunch in order to get ready for the rounds ahead.

### Afternoon Session

The only sign the afternoon portion of the match might prove interesting is the number of civil servants in attendance, with 16 government employees descending on the courtroom, compared with only five on the IBM side — a major reversal in the usual ratios.

Again, light jabbing prevails in the opening minutes with Barr content to just ask for questions to be reread in order to collect his energy.

Case can't recall very much.

But then the action picks up as Chapman moves low to aim a document from the Memorex Corp. case directly at Case's midriff. Case wrote the document and it clarifies a lot of things he could not recall.

Barr never sees the blow, and when the referee orders him to produce the original, Barr counterpunches, claiming the government probably already has it and can't find it and that finding the document would be an "unfair" burden on his client. The referee rules against him despite some furious counterpunching which almost brings tears to the eyes of observers worried about this horrendous burden on one of the nation's largest companies.

### No Need to Worry

But after the short fray, he has little need to worry since Case cannot recall the document even though it is signed by him and bears his mail address and telephone number at IBM.

The referee decides there is ample cause to let it into evidence so ringside watchers can see it, but holds off that decision for a later date, engendering a sharp exchange of body blows between the referee and the IBM heavyweight.

Barr then accuses the referee of badgering the witness, his partner, at which point the judge replies "You just want me to say I think he's evasive" and accuses Barr of badgering the judge. A standoff — but a standoff with the judge asking and finally getting Barr to sit down — after several requests.

### More Memory Lapses

Next, Case can't recall another document entered into evidence, and the judge says he might have to call another IBM employee to testify about it. This leads to the heaviest punching of the day, with Barr immediately telling the judge not to "threaten" such things and the judge saying his position as referee allows him to do exactly that.

Barr then claims the judge is "abusing" his position as referee and says the judge might as well leave his position as referee and come down and fight for the government.

In a heavy counterattack, the judge indicates that Barr is abusing every prerogative the court has allowed him and that Barr has been frustrating the government's cross-examination all day. But Barr strikes back to the body quickly, saying the judge is showing prejudice in favor of the other side, the judge rejects this comment "out of hand."

Court soon recesses for the day.

### Off to Slow Start

The next day opens in a desultory manner with Case unable to recall much of what happened in the 1960s, and there is only light jabbing between the two fighters.

He cannot, for example, remember what he said about the advanced computing system under development at IBM in the mid-1960s, even though he testified on that topic in February.

He believes they might be true, however, even though he cannot remember the words.

The sparring continues through the morning with no serious blows, although the seeds are sown for a possible confrontation in the afternoon, when Case says he feels the 704 was used for commercial applications more than for scientific applications.

Two hours later — after the lunch break — Case immediatey testifies that he can't recall the conversation he had with IBM lawyers when they left the courtroom two hours earlier.

But then Chapman introduces a document that shows market planners at IBM felt the 704 machine was used about 80% of the time for scientific applications and that most machines designated scientific by the government were used between 80% and 100% of the time for such applications.

Case says he doesn't know anyone at IBM who feels that way and Barr objects because he was not shown the document earlier.

However, Chapman says he did not show it to the IBMers because he was worried about "prevarication." That brings the best outburst of the day with Barr threatening to take Chapman before the grievance committee of the American Bar Association if he doesn't retract the statement. He doesn't.

With charges of bad faith echoing from both sides and a few more light rounds, the court recesses. With Barr back on the scene and with a good scrapper in front for the government, the next rounds of this four-year-old fight promise to hold a lot of action — even if they promise little illumination on the subject at hand.

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# *Memorex Case Brings IBM Bid*

SAN FRANCISCO — IBM has filed motions for a directed verdict in its favor in the more than $306 million antitrust suit filed against it by Memorex Corp.

That case ended in a mistrial in federal district court here recently when the jury could not agree on IBM's guilt or innocence [CW, July 10].

Memorex has 10 days to respond to IBM's motions; IBM then has until Aug. 4 to file a rebuttal.

The motions argued that during the trial Memorex did not offer any substantial evidence of unlawful pricing. Further, according to IBM, "no reasonable jury could find that Memorex's development and marketing of computer systems were activities that were directly affected by IBM's alleged antitrust violations."

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## Rejects Open Terminal Market

# FCC Postpones End Date of Computer Query

**By Edith Holmes**
CW Washington Bureau

WASHINGTON, D.C. — The Federal Communications Commission (FCC) has postponed final action on the Second Computer Inquiry until September and rejected the recommendation of its Common Carrier Bureau that computer terminal equipment be left unregulated and open to competition.

The FCC commissioners sent the bureau back to the drawing board with instructions to draft a policy on terminal equipment that fits within "the environment created by the 1956 Consent Decree" between the Justice Department and AT&T.

The Consent Decree now prevents the FCC from allowing the telephone company to sell its terminal wares in an unregulated environment.

The delay partly resulted from several commissioners' feelings that AT&T's absence from the development of terminal technology would not be "in the public interest."

Under the 1956 decree, AT&T can provide only common carrier communications services, but the Bell System has stretched the bounds of that agreement by applying to the FCC to extend the realm of communications to include data processing in some product areas on a case-by-case basis.

For example, in the last several months, the courts ruled the AT&T Dataspeed 40/4 terminal performed more communications than DP functions. As a result of that controversy, the commission agreed to take another look at the 40/4 after it reaches a ruling in the Computer Inquiry.

That ruling would define the boundary between the merging fields of DP and communications and determine the extent to which common carriers would be permitted to compete in the terminal market.

### Open Market Urged

After months of receiving and digesting industry comments and replies in the second Computer Inquiry, the Common Carrier Bureau suggested the FCC take terminals out of the data communications controversy. It recommended at a recent FCC meeting that common carriers, including AT&T, be allowed to compete in an open terminal market as long as they do so through a separate subsidiary, taking care not to subsidize their terminal efforts with their communications profits.

Communications common carriage was defined by the bureau to mean the transmission of electronic signals — "everything that begins and ends at the jack." However, its definition also included some DP functions necessary to communications, the Common Carrier Bureau stated.

But the bureau found DP applications beyond media conversion and network signaling are not common carriage and recommended they be handled through a separate company by any communications firm wanting to sell them.

Under its proposed resolution to this Computer Inquiry, the bureau said AT&T's Dataspeed 40/4 would fall outside the ancillary DP functions needed to support common carriage. The 40/4 is currently an FCC-tariffed item and would have to be provided on an unregulated basis if the bureau recommendations were adopted by the commission.

### A Place for Bell

"Data processing is going to become an increasing part of the capabilities provided in terminals," Common Carrier Bureau Chief Walter Hinchman stated at the FCC meeting. "We have tried to focus on how Bell should be involved in the terminal market.

"We don't want the cross-subsidization of terminal efforts by AT&T's monopoly base, but we do want to set up a structure in which Bell can participate fully in a competitive way in the terminal market," Hinchman added.

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(Continued on Page 6)

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# AT&T Promises General ACS Compatibility

*(Continued from Page 1)*

such as IBM's Systems Network Architecture (SNA), which uses Synchronous Data Link Control (SDLC).

ACS documents state, however, that AT&T will hold dicussions with mainframe vendors to achieve a "common definition of a bit-oriented network interface protocol."

A Message Level Interface protocol will allow host CPUs to transmit data to an ACS network on a message handler-to-message handler basis so the CPU does not have to support each remote terminal on an individual basis.

Several emulation modes are provided including the binary synchronous cluster controller, which allows ACS to interact with a customer CPU as if the network were a binary synchronous cluster controller, AT&T said. ACS can also emulate Ascii start/stop devices and binary synchronous batch terminals.

User control over segments of ACS provides options on the flow of messages, according to the FCC filing. Network Control Program types of functions will be dynamically controlled from special terminals at the customer site to alter certain ACS parameters at telephone company locations, the AT&T spokesman added.

These functions relate to network operations and do not include application-related functions, which will remain under user control in user CPUs, he noted.

Certain customization options related to data entry and text editing functions will allow the user to manipulate the data so it can be handled by the ACS network. These include interactive functions such as message entry validation, message form definition, message preparation and editing.

Noninteractive functions under user control but resident within ACS include consolidation of messages, auto distribution and message storage management.

ACS will provide the user with three ways to invoke the functions desired — with fixed parameters prespecified on a per-application basis; with variable parameters dynamically specified on a per-call or per-message basis; and with data within a message which is interpreted by a "customer-customized program," AT&T said.

# House Begins Communications Hearings

*(Continued from Page 1)*

stantial public benefits, Shenefield contended, citing the Antitrust Division's long-time support of this position.

Congressman Lionel Van Deerlin (D-Calif.), chairman of the House subcommittee and sponsor of the communications act rewrite along with Rep. Louis Frey Jr. (R-Fla.), opened hearings on the lengthy and complex legislation with a discussion of the structural and procedural changes the bill would make in communications law [CW, June 12]. This week, the subcommittee's sessions will begin to explore possible alterations in the regulation of common carriers.

### Competitive Considerations

In his appearance on Capitol Hill, Ferris pointed out that under the public interest standard, the FCC has taken antitrust-related and competitive factors into account in arriving at its decisions. He cited the common carrier field where, he maintained, the commission's thrust has been toward increasing consumer choices and lowering the costs of communications services.

On the other hand, Shenefield called the diversity of terminal equipment offerings and long-haul communications service options evidence that competition can work in the common carrier field. "Based on our experience with many kinds of economic regulation, it is clear . . . that regulation has simply not worked as an economic control mechanism and is not likely to be workable in the future," the Assistant Attorney General maintained.

Former FCC Chairman Newton Minow, now in private law practice in Chicago, asked the subcommittee to remember why communications was regulated in the first place. "Communications became a regulated industry because Congress decided this was not a business to be left to the market — there were social issues to be considered," he said.

How will the proposed new commission — called the Communications Regulatory Commission under H.R. 13015 — know when market forces are "deficient" and when rates are "affordable?" Minow asked the congressmen.

The former commissioner and FCC chairman with the longest record in the service of the regulatory body, Rosel Hyde stated that he didn't believe the "public interest" and "just and affordable rates" standards need to be abandoned. "I don't believe the present emphasis on market forces should be viewed as excluding these social values," he said.

Referring specifically to the common carrier field, Dean Burch, who also served as FCC Chairman, told Van Deerlin, "You have opted for a market structure which I applaud, but without sufficient reference to the market as it is today . . . I'm concerned that you've prematurely stripped the commission of its rate-setting powers. I'm concerned that simply declaring a victory over monopoly is different from achieving it."

### Warning From Shenefield

Shenefield warned the House Communications Subcommittee to expect opposition from the FCC, which has grown used to the 44-year-old regulatory scheme for telecommunications, and from firms who see their advantage in maintaining the regulatory status quo.

Some regulation will be needed to ensure that whatever dismantling of the regulatory structure does occur won't unleash the industry giants to destroy smaller firms in the first blush of "competition," he said.

FCC commissioners — old and new — expressed concern over the bill's plan to give spectrum allocation and policy-making responsibilities to the National Telecommunications and Information Administration (NTIA) in the Commerce Department. NTIA would become the National Telecommunications Agency under the proposed law.

Ferris stressed the importance of the relationship an independent multimember regulatory agency such as the FCC has with Congress. "I believe the bill's proposal to shift spectrum allocation and policy-making powers to a single executive branch administrator could seriously erode mechanisms created by Congress to insulate [communications] from direct or indirect government control," Ferris stated.

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# FCC Delays End to Inquiry

*(Continued from Page 5)*

1956 Consent Decree poses problems for this suggested FCC policy, Hinchman noted that, the limits of the decree currently are a question. AT&T is presently marketing computer programs, he said, that do more than aid common carriage [CW, July 10].

Hinchman stated that the Common Carrier Bureau believes there should be some modification to the decree that would permit AT&T to participate in the terminal marketplace.

FCC commissioner Joseph Fogarty led other members of the commission in expressing the concern that by setting policy before the decree is modified, the FCC might effectively exclude AT&T from providing terminal equipment. "That would be a travesty as far as the public interest is concerned," he said.

Fogarty suggested that the commission continue to review devices for their communications and DP content on an "ad hoc basis" while the Common Carrier Bureau seeks to modify the decree. Otherwise, he said, AT&T might not be able to offer such "innovative" services as its Advanced Communications Service (ACS) [CW, July 17].

"I am certain that if we adopt these proposals, AT&T would be prevented from providing ACS to the public," Fogarty stated.

The Common Carrier Bureau recommended the Computer Inquiry proceed by setting a date for adopting its proposals that would also permit negotiation on the 1956 Consent Decree. Not only should the FCC not feel constrained by the decree, but the commission will receive little reaction from either AT&T or the Department of Justice unless it indicates what policies it plans to implement, the bureau argued.

### No Incentive

So far, there has been no incentive for Justice or AT&T to modify the "archaic" decree, Hinchman told the FCC. "AT&T will live with the decree so long as it can get new offerings into the market through the FCC's tariff procedures and the Justice Department, with its present antitrust suit against Bell, is in no mood to reopen an old decree," he said.

The FCC will face a long-range and serious problem if it continues to try to decide when a piece of equipment is a DP device and when it is to be used chiefly for communications, the Common Carrier Bureau warned. The key issue facing the commission in this investigation is how far tariffed offerings should be allowed to extend into what many believe isn't common carriage, but DP.

The bureau further recommended that the FCC begin an examination of its "maximum separation rules" that requires a common carrier to set up a separate company when it engages in DP or services other than communications.

Maximum separation may not be the best mechanism for ensuring that cross-subsidization of these services by regulated communications profits does not occur, the bureau stated, citing its difficulty in coming up with foolproof accounting procedures to separate one business from the other.

# ACS Debut, FCC Inquiry Weave Web of User Issues

**By Ronald A. Frank**
CW Staff

AT&T's introduction of its Advanced Communications Service (ACS) and the deliberations of the Federal Communications Commission (FCC) in the Computer Inquiry II have raised issues that will drastically alter data communications for years to come.

In addition, substantive hearings begin this week in Congress on proposed changes to the Communications Act of 1934.

The item of most interest to the user is ACS [CW, July 17] and the capabilities it will provide to simplify network operations. But all three events are interrelated.

It is important to note, for example, that there is a serious question whether under current FCC regulations, AT&T can offer ACS as purely a communications service. But the FCC's Common Carrier Bureau, the FCC itself and the legislation proposed to modify the Communications Act all aim at giving AT&T the competitive framework on which ACS can be introduced.

There is general agreement that competition is good for the user and the industry suppliers. Basically this question of competition has two aspects: service and equipment.

The FCC's Computer Inquiry II hearings last week wrestled with the problem of how AT&T can compete in the terminal area (see story on Page 5). The much discussed AT&T-Justice Department Consent Decree of 1956 bars Bell from providing any service judged to be noncommunications.

The introduction of ACS has raised the related issue of whether this service should be provided by a separate Bell subsidiary. The FCC said it would take a look at whether competitive service areas would require separate phone company subsidiaries, but it has not yet done so.

Meanwhile it is expected that those vendors now operating in the data communications terminal and service areas will vigorously object to a competitive ACS offered under the protective cloak of regulation.

### Relation to Cost

For the user, the question of a regulated or unregulated ACS may have a direct bearing on what it will cost to get the service. If ACS remains a regulated service, as AT&T would like, it might cost much less than other turnkey network services, such as those provided by time-sharing vendors.

The low cost would result from the fact that AT&T already has facilities in place for its Dataphone Digital Service and Dataphone Switched Digital Service. But the FCC would be watching to ensure that Bell did not subsidize ACS with the proceeds of those services.

The user finds it difficult to worry about services that are too low in cost, but economic theory holds that any deficits for one service can be made up by increased costs for other services, such as residential service.

If AT&T is to provide ACS through a nonregulated, competitive company, a way must be found to cancel or alter the 1956 Consent Decree. From a procedural standpoint, it is not clear whether a regulatory commission such as the FCC can tell the Justice Department it must change a decree it has negotiated.

## Analysis

Unfortunately, the requirements of regulation often seem to work counter to the best interests of the end user. In this context, the concepts proposed by AT&T for ACS may be just what the data communications user needs.

The effort of bringing those concepts within reach of the user, however, will probably be mired in regulatory and legislative proceedings that have little to do with his day-to-day problems.

# *AT&T Software Under Probe*

WASHINGTON, D.C. — The Justice Department has initiated an inquiry into charges by an industry association that AT&T is marketing computer software in direct violation of a 1956 Consent Decree.

That decree bars the Bell System from competing in any area outside the provision of common carrier communications services, according to the Computer & Communications Industry Association (CCIA) [CW, July 10].

In a letter to the association dated July 6, John L. Wilson of the Antitrust Division's Judgment Enforcement Section apologized for the "extreme delay" in the Justice Department's response to the CCIA's April 7 letter on this issue.

"As a result of your submission, we have initiated an inquiry into AT&T's offering of computer programs in the commercial market," Wilson wrote. He added that the department will complete its study of the matter before commenting further.

The CCIA has accused AT&T of using Western Electric Co., its manufacturing arm and wholly owned subsidiary, as a marketing outlet for software manufactured by Bell Laboratories. These programs include software for the overall operation of general-purpose computer systems and for such applications as text editing and typesetting, according to Bell System advertising.

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# Carter Halts Univac Sale to USSR

(Continued from Page 1)

cumstances in U.S.-Soviet relations.

Although Univac has not been officially notified of the sales cancellation, a spokesman for the firm said it would accept the President's decision.

Univac began negotiations with Tass several years ago for sale of the large-scale 1100 series system. The final request for the export license had been under consideration since last fall by officials in Commerce's Office of Export Administration, Bureau of East-West Trade Department.

Prior to Carter's action, the federal government had encouraged industry leaders to trade with the Soviet Union; this will probably continue unless a direct change of federal policy occurs, the Univac spokesman said. In 1975, the firm sold an 1106-2 multiprocessor system with specialized software to Aeroflot, the Soviet airline, for $10 million.

The canceled system was a text editing system primarily to help Tass cover the 1980 Olympics in Moscow. The Soviets felt that the extensive news coverage required by the Olympics called for a system for filing correspondents' copy and transmitting it to their countries, the Univac spokesman said.

### Carter Praised

Carter's action was lauded by those in the computer industry who had been protesting the Soviet Union's treatment of dissidents, particularly Sharansky. Many computer societies had expressed concern and outrage during Sharansky's year-and-a-half confinement before his trial by writing letters of protest or, like the Association for Computing Machinery (ACM), cutting ties with the Soviet scientific community [CW, Dec. 12].

Dr. Herbert R.J. Grosch, past president of ACM, said he was glad to see the President following up something for which the scientific community had been working. But Carter's action, even if it were more comprehensive, still "wouldn't shut the Soviet Union down," Grosch said. It might hurt the USSR economically to an extent, but it wouldn't hurt it vitally, he added.

Grosch would like to see Carter's action extended even further — to decrease any kind of scientific intercourse between the two countries. He acknowledged, however, that many industry people feel the most effective method for influencing the Soviets is to keep channels open.

"Right now they're getting the better end of the deal. They get more from us and we get damn little from them," he said.

Sharansky's trial was a "put-up job ... The whole thing is garbage," he added.

### Acpa Urges Boycott

The Association of Computer Programmers and Analysts (Acpa) also commended the President's cancellation of the sale, but its board chairman, Robert White, believes the action probably won't harm or even cause much notice within the Soviet government.

Acpa took issue with ACM when it broke ties with the Soviet Union and stated at that time that oppressed countries need interaction with those in "the free world" [CW, Jan. 16]. But the continuing violations of the Helsinki statement of human rights by the Soviets has now caused Acpa to ask the computer industry to voluntarily cease financial dealings with the USSR until that country "clearly demonstrates a willingness to abide by the Helsinki human rights agreement," White said.

Although calling on industry leaders to begin an economic boycott, Acpa still feels it is necessary to leave other lines of communication open. Economic sanctions will be the most effective way to put pressure on the Soviets, White said.

ACM and Acpa have been the two computer organizations most active in Sharansky's behalf. Organizations such as the Computer and Business Equipment Manufacturers Association (Cbema) believe there should be a separation of political and economic concerns.

At his trial, Sharansky called the charges against him "absurd" and called on dissidents to keep protesting. It has been rumored that Sharansky may be exchanged in the near future for two Soviet spies now being held in the U.S.

# CLA Sets Plans For Fall Meeting

WASHINGTON, D.C. — The Computer Law Association's (CLA) fall meeting here Oct. 16 will focus on contracting considerations of technology in the 1980s.

Already confirmed as speakers for the meeting are Daniel McCracken, president of the Association for Computing Machinery, who will talk on systems and software, and John Gosden, vice-president of the Equitable Life Insurance Society, who will look at technology from the user viewpoint.

### Contract Considerations

Discussing contract considerations will be three lawyers in private practice: Roy N. Freed of Boston, who will speak on hardware, Paul S. Hoffman of Croton-on-Hudson, N.Y., who will discuss software; and Susan H. Nycum of San Francisco, who will focus on third-party leasing.

Further information on the meeting is available from Michael Yourshaw, Kirkland, Ellis & Rowe, No.1100, 1776 K St. N.W., Washington, D.C. 20006.

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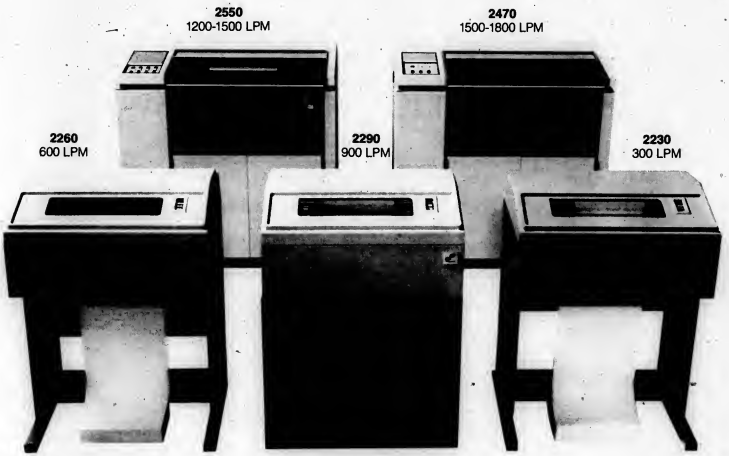

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## *Marijuana Worth $400 Million Seized*

# DP, Satellites Help DEA Bust 40 Drug Ships

**By Tim Scannell**
CW Staff

WASHINGTON, D.C. — Computers and several satellites on a multimile "high" were used by agents of the Drug Enforcement Adminstration (DEA) this year to monitor and seize 40 ocean-going vessels attempting to smuggle more than 1.1 million pounds of marijuana into the U.S.

The operation, code-named Stopgap, was conducted in conjunction with the U.S. Navy and the U.S. Coast Guard and resulted in the seizure of "one out of two or three" marijuana shipments originating from Colombia, according to DEA administrator Peter Bensinger. Colombia supplies more than half the marijuana coming into the U.S., he said.

Drugs with a retail value of more than $400 million were captured during the Stopgap program, which began last December and ended in April, Bensinger added. The operation succeeded in cutting off the flow of marijuana into the U.S. by at least one-third and escalated the price of the drug in Colombia from $20 a pound to as much as $80 in some cases, he said.

### Satellite Tracking

The ships were tracked by Navy Ocean Surveillance Satellites (Noss) put into orbit more than two years ago to monitor maritime activities. The contraband-carrying vessels were pinpointed by the satellites' radar and shadowed, at night, regardless of prevailing weather conditions, Bensinger explained.

The Noss data on the ships' whereabouts was transmitted and input automatically to twin Control Data Corp. 6400 computers at the Naval Ocean Surveillance Information Center. The computers, with 196,000 words of memory and extra core available for 512,000 words, correlated the tracking data and relayed it to the DEA.

The DEA then informed the Coast Guard which, in turn, intercepted the marijuana-laden vessels before they reached U.S. shores.

### 'Classified World'

Both Bensinger and a spokesman for the Navy declined to elaborate on what kind of data was given to the DEA or just how it was used except to comment that "this is a classified world" and "the Navy uses all the resources it has."

The satellites, Bensinger pointed out, were not used to spot or identify the marijuana hidden on board the confiscated ships. The vessels were discovered to be carrying the potent plant by undercover DEA agents in Colombia.

The ships usually carry the marijuana to prearranged points 200 miles off the U.S. coast for transfer to small yachts and fishing boats, he said. The drugs are then shipped to American ports and distributed throughout the country by various criminal dealers.

### 220 Arrests Made

In all, 220 arrests have been made as a result of the seizures, almost all Colombian nationals. Most of the suspects were kept in U.S. hotels overnight and then deported to Colombia the following morning, Bensinger said.

In addition to the 40 ships seized during the operation, the Coast Guard also intercepted four other vessels which were scuttled by their crews before they could be boarded. Members of the sunken ships, drifting in lifeboats, were rescued by the Coast Guard.

Many of the ships boarded were missing their captains and first officers, Bensinger observed. Apparently, they had slipped off the ships after realizing the vessels were under surveillance.

"The crews said they were grateful we found them," Bensinger recalled. "They said they were running short of food, water and supplies."

Because of the program's success, the DEA plans to run it again this fall when the growing season starts.

# ASM Picks Schauss As 1978-79 President

CLEVELAND — Benjamin Schauss, manager of administrative services with United Nuclear Industries, Inc., has been appointed president of the Association for Systems Management (ASM) for the 1978-79 year.

Schauss has been a member of the ASM board of directors since 1973 and has served as international secretary, vice-president and president-elect.

He was also president of the ASM's Columbia Chapter and has served terms as division director and ASM Division 20 vice-chairman and chairman.

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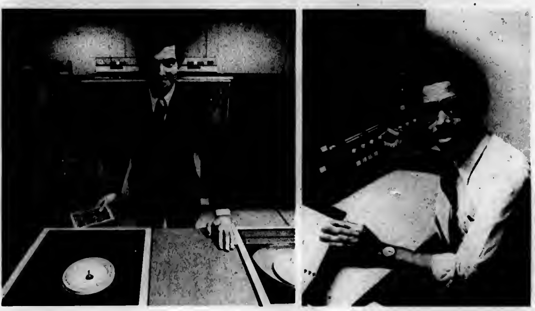

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## Even With More Than 100 Lines

# Blind Operators Find DP-Based Phones Easy

**By Marguerite Zientara**
CW Staff

LOS ANGELES — Blind telephone operators at the Braille Institute of America have adapted easily to a computerized business telephone system tht reportedly saved the institute almost $10,000 in its first year of operation.

The system, which is modularly expandable, currently has 19 incoming trunks and more than 100 lines, with additional extensions at branch offices in Palm Springs and Anaheim, Calif. Its technology and the legally blind operators' talent for memorization have combined to make the system a success, according to Dorothy Coleman, communications manager for the institute.

The institute plans to educate other blind people in the use of the Rolm Corp. CBX system so they may seek previously hard-to-find jobs within the business community, according to Coleman.

### Serves 15,000 People

The Braille Institute of America provides library service, education, job training and about 200 other services to approximately 15,000 blind people in Southern California. "The blind rely on the telephone perhaps more than any other group. It is much easier for a blind person to telephone than to write a note," Coleman pointed out.

With the system, audible tones indicate the status of a call. A double interrupted ring signals an incoming call, a single interrupted ring denotes internal calls and a long uninterrupted ring is used for callbacks.

After answering a call, an operator can access any extension by pushing three buttons on a "digital pad" keyboard similar to that of a pushbutton telephone.

The time-division multiplex switch is based on Rolm's Industrial Computer with 32K bytes of memory. Compath Business Telephone Systems, the interconnect firm that installed the system two years ago and maintains it, uses a Texas Instruments, Inc. Silent 700 printer to run eight diagnostic tests every morning.

The printer is located at Compath's offices and accesses the Braille Institute and 54 other systems using a dial-up code, according to Bob Gratcl, Compath operations supervisor.

The remote terminal checks on the condition of the computer, the expander cards, stations, trunks and outpulsing equipment. It also monitors the conference bridges, keyboard equipment and the operator's console.

Jennifer Chambers, who is blind, answers a call coming in on the Braille Institute of America's computer-based telephone system. Chambers uses a braille stylus to take messages.

Since all diagnoses are completed by 7:15 every morning, if there is a problem "we can clean it up from the office or dispatch a man before the start of the workday," Gratcl said.

The institute is taking advantage of Communication Line Service, which allows library staff members to call each other with a two-digit number. The service has a distinctive ring so those called know it is from in-house.

Universal Night Answer lets the institute answer all incoming calls when no attendant is on duty. Incoming calls are automatically routed on specified trunks and cause a night chime to ring. Anyone within the institute can then answer the call from any station by dialing an access code.

An executive at the institute can route all calls made to his extension to a secretary's line using the Secretrial Intercept feature of the Rolm CBX system.

A camp-on feature allows a caller within the institute to place himself on "hold" to another inside line while a tone notifies the called party. The person called can then place his current call on "hold" and connect with the camp-on party.

The system has saved money by being programmed for least cost routing. "You just dial the number and the system automatcially chooses the least expensive line to use, either foreign exchange, local or Wats," Gratcl explained.

In addition, in buying a system rather than leasing one, the institute was eligible for tax credits and tax write-offs.

### Only One Problem

Only one major problem has occurred since the system was installed two years ago, according to Chip Hazen, the institute's business manager. Last month a battery in the telephone switching apparatus burned out and all incoming calls went to the four emergency lines instead of to the proper departments. It took a week and a half to rectify the problem.

As a result of the problem, Compath suggested the institute provide an environment for the computer system at less than 78° F. "Every degree over 78° over a period of time breaks down the lifetime of the system's components," Gratcl said.

The computer room has been between 85° and 95° for the past two years, Hazen said. "It's very hard for us to provide that cool environment now, because the system wasn't designed that way originally," he said.

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# Guide Offers Quick Access To U.S. Sources, Systems

WASHINGTON, D.C. — For those who wish to cut through the massive federal bureaucracy and get right to the information they need, a directory of *Federal Information Sources and Systems* is available from the Government Printing Office.

The directory describes more than 1,400 data collection and reporting systems maintained by 91 executive agencies. Each agency has a listing that describes its system, provides the name and telephone number of a contact office and tells if the information is available to the public.

The directory describes such data bases as that of the Department of Commerce, which details the socioecononmic characteristics of areas in the U.S. where the Economic Development Administration has approved projects.

Another example is the Department of Energy's Reactor Information File that edits and processes parametric, cost and schedule data received from electric utilities and other sources in nongovernmental nuclear power plants.

A final sample of the publication's entries is one describing the General Services Administration's worldwide inventory of government computers, manpower requirements and cost.

The directory, which has a subject index, will help those who need to know if there is government information available to help them with problems, as well as those attempting to identify government markets.

The book costs $6.75 from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

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# Survey: Checkless U.S. Still a While Away

**By Howard A. Karten**
CW Staff

ATLANTA — The checkless society forecast for the end of this decade seems unlikely to evolve for some years to come — instead, "more checks" and "more plastic" form the scenario for the immediate future, according to a recent survey conducted jointly by Payment Systems, Inc. and Darden Research Corp. here.

The study, based on interviews with 1,500 adults who use the services of a variety of financial institutions — commercial banks, savings banks, savings & loan associations, finance companies and credit unions — found a "dramatic" upsurge in the use of credit cards of all types, an estimated 475 million of which are held by the U.S. adult population.

The 230-page "Payment Systems Perspectives '78" warned that the increasing awareness and availability of electronic funds transfer (EFT) services do not always translate into high levels of usage. The report also noted that each EFT service offered the public will require a unique marketing strategy since each will be different.

"In the short run, it appears the successful marketing of profitable EFT services will be accomplished by 'zeroing in' first on those services that are most compatible to the consumer's present payment habits," the report observed.

### Significant Differences

Surveying six EFT services — automated teller machines (ATM), preauthorized charges, direct deposit of payroll, pay-by-phone bill paying, automatic check approval at the point of sale (POS) and POS banking — the study found significant differences in awareness, availability and usage. While approximately 75% of respondents showed awareness of ATMs, only 9% used them; by contrast, 32% were aware of POS banking, but only 1.9% actually took advantage of the services.

The most widely used service, preauthorized charges to checking accounts, was used by 17% of those answering the survey, with approximately 67% aware of the service.

Levels of awareness, availability and usage of preauthorized charges to checking accounts were found to be significantly higher than the national average in two geographic areas: the West North Central and West South Central. Usage of that service was significantly lower than the national average in both the New England and Mid-Atlantic regions, the study found.

No significant regional differences were found in interest in preauthorized charges to checking accounts.

### Development Curbs

Addressing the latter point, the study identified two factors that appear to limit the further development of the service. The first is the difficulty of many financial service institutions to offer the service; the second is the lack of desire of many financial services to actively promote it.

Additionally, the study found many consumers perceived the service as more of a potential problem than an added convenience: "There is an underlying fear by many of losing direct control over one's financial affairs, as well as the perception that the penalties to be incurred as a result of potential errors of the system — such as bills not paid on time — might well more than offset the possible savings in time and postage."

A key issue in the further development of extensive EFT systems is privacy, the study indicated. Nationwide, 38.1% of those polled reported being "highly concerned" with misuse of personal financial information. This concern was highest in the New England area with 47% of those in this area reporting high concern, and lowest in the West North Central area, where only 31.4% of those responding said they were "very concerned."

By contrast, 35% of those surveyed nationwide said they were not concerned.

Payment Systems is a research and consulting firm specializing in the study of payment systems, EFT and consumer financial services. Darden is a market research company.

Complete copies of the study are available for $50 each from Payment Systems, Suite 2735 Peachtree St., Atlanta, Ga. 30303.

## Calendar

Aug. 21-25, Washington, D.C. — **Digital Transmission System Engineering**, sponsored by George Washington University. Contact: Martha Augustin, Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

Aug. 21-25, Washington, D.C. — **Small Computer Systems**, sponsored by George Washington University. Contact: Martha Augustin, Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

Aug. 23-25, Washington, D.C. — **Microfilm Information Systems**, sponsored by George Washington University. Contact: Martha Augustin, George Washington University, Washington, D.C. 20052.

Aug. 28-Sept. 1, Washington, D.C. — **Modern Data Communications**. Contact: Martha Augustin, Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

Aug. 28-30, Vancouver, B.C. — **Planning a Productivity System**, sponsored by the Theorem Institute. Contact Michael E. O'Neill, president, Theorem Institute, Suite 590, 1737 N. First St., San Jose, Calif. 95112.

Aug. 29-31, Vancouver, B.C. — **Fundamental Crime Analysis**, sponsored by the Theorem Institute. Contact: Michael E. O'Neill, president, Theorem Institute, Suite 590, 1737 N. First St., San Jose, Calif. 95112.

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# Managers on the Move

DR. PAUL M. KALAGHAN has been appointed director of the computing facility at the Harvard-Smithsonian Center for Astrophysics (CFA) in Cambridge, Mass.

Kalaghan, an astronomer, has been a supervisory research programmer in the Geoastronomy Division since 1974. He will continue his research on tethered satellites but one of his principal responsibilities as computing director will be the implementation of a modern time-sharing computing system with CFA.

Before joining the center, Kalaghan was a physicist at the Air Force Cambridge Research Laboratory. He holds a Ph.D. in astronomy from Harvard University.

• • •

ROBERT E. CHILDS has been promoted to director of information systems for North American Car Corp. in Chicago, the railcar division of Tiger International.

Childs joined the organization in September 1976 as manager of technical support after a stint with Flying Tiger line, where he managed computer operations.

• • •

MICHAEL R. KIMBALL has been appointed director of the newly formed computer systems division at the Williamette Valley Co. of Eugene, Ore.

Kimball will be responsible for daily computer operations for the firm and its various subsidiaries as well as computer time-sharing, sales and client consultations.

Kimball joined Willamette in 1972 as DP manager after four years as a teacher of DP at MTI Business College in Long Beach, Calif.

Kimball holds a bachelor's degree in business administration from Bowling Green University.

• • •

AL PEARSON has been promoted to manager of the information systems development department at Supermarkets General Corp.'s Pathmark Division in Woodbridge, N.J. The division provides computer systems design and DP services for all six of SGC's operating divisions.

Pearson joined the company in 1967 as a programmer and since then has held various other positions within the department.

• • •

EDWARD (TED) BECKER JR. has been appointed vice-president and director of computer services for Heritage Bancorporation, Inc. in Hillside, Ill.

Prior to joining Heritage, Becker was vice-president and general manager of 11 national data service centers for Greyhound Computer Corp.

The Heritage executive has served as president of the Sales and Marketing Executives Association of Chicago and treasurer and board member of the Advanced Management Program at Syracuse University. He received his undergraduate degree at the University of Colorado.

Edward Becker Jr.

• • •

LAURENCE T. BURDEN has been promoted to director of management information services by Northwest Industries, Inc. in Chicago.

Prior to joining Northwest in June 1974, Burden held several managerial and technical positions with the General Electric. Co.

Recipient of a bachelor of science degree in mathematics from Grove City (Pa.) College and a master of science degree, also in math, from Indiana University of Pennsylvania, Burden did post-graduate work at Pennsylvania State University and attended the Center for Information Systems Research Program at MIT's Sloan School of Management.

• • •

IRENE KING and STEVE OLDENBURG were recently named assistant controllers at Computer Systems of America, Inc. in Boston.

King will be responsible for systems operation while Oldenburg will handle period closings an[illegible]count maintenance.

# Well-Known DPers Garner Top Awards From IEEE

BOSTON — Several of the nation's leading figures in industry and education were honored here recently by the Institute of Electrical and Electronics Engineers (IEEE).

Dr. Robert N. Noyce, chairman of the board of Intel Corp., received the Medal of Honor, the highest award of IEEE, "for his contributions to the silicon integrated circuit, a cornerstone of modern electronics." Noyce a founder both of Fairchild Semiconductor and Intel, holds several patents and has been honored by the Franklin Institute and the National Association of Manufacturers.

M. Robert Aaron, John S. Mayo and Eric E. Sumner of Bell Laboratories received the 1978 Alexander Graham Bell Medal "for personal contributions to, and leadership in, the practical realization of high-speed digital communications."

Dr. Daniel E. Noble, chairman of the Science Advisory Board and former chief technical officer of Motorola, Inc., received the 1978 Edison Medal "for leadership and innovation in meeting important public needs, especially in developing mobile communications and solid-state electronics."

Dr. Harry W. Mergler, Leonard Case Professor of Electrical Engineering at Case Western Reserve University, received the 1978 Lamme Medal "for pioneering research and creative industrial application of digital technology to machine tool and industrial control systems."

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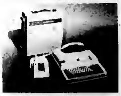

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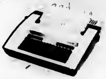

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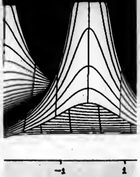

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# Service Helps Clients Gain Copying Permission

**By Tim Scannell**
CW Staff

NEW YORK — Reproducing or photocopying copyrighted works for public or private use usually involves the confusing and sometimes lengthy task of obtaining individual licenses and permission from publishers.

However, an independent, nonprofit organization here, acting as a centralized liaison between authors or publishers and the general public, has expedited the job of procuring multiple copies of needed articles, journals and even films. The Copyright Clearance Center (CCC), which presently represents more than 165 publishers and approximately 1,633 serials, periodicals and journals, uses a computer-based system to process each request for an article and assign the appropriate fee.

The center itself does not release copies of the requested material, according to spokeswoman Virginia Riordan, but provides libraries and other organizations with the needed permission to legally make copies. The organization, in fact, "obviates the need to obtain hundreds or thousands of individual licenses" from each author or copyright owner when photocopying is performed, the center's handbook stated.

Patrons of the system are required to file frequent reports with the center detailing the amount of photocopying performed for which fees must be paid, Riordan explained. These reports usually consist of marked copies of first pages of the articles copied, documented data logs or computer-readable forms.

The center inputs this usage information to a data bank containing the list of publishers and authors and matches the article with the appropriate charge. Each publisher sets its own fees and retains the right to decide whether a journal or excerpt of an article will carry a charge, Riordan explained.

The CCC tallies the amount owed by a particular establishment, includes a handling charge (usually 25 cents per article copy) for operational expenses and sends the total bill to the requesting party.

The center doesn't try to prevent publishers from continuing their normal permissions procedures or hinder users from asking for articles themselves. However, it does provide users with a single mechanism through which to make copies legally.

### Fine Legal Line

Unfortunately, Riordan said, there is a very thin line separating the legality and the illegality of duplicating the printed word. The recently enacted Copyright Act of 1976, written to update a previous law established in 1909, offers some guidance to libraries and similar institutions involved with photocopying but provides no "cut and dried" system, Riordan explained.

Reproductions and rights of copy are based upon an individual's "fair use" of the material, and fair use is determined by a set of guidelines rather than exact rules.

For instance, a person is free to make an unreported photocopy of an article or document if it is for noncommercial use, less than 2,500 words in length and if time doesn't permit contacting the copyright owner for permission to make the copy.

On the other hand, except for a few indistinct exceptions, multiple copying or "systematic" duplications are strictly forbidden, Riordan pointed out.

"Our service is for people who want to make photocopies in excess of fair use. All the user has to do is flip through our listings, find the journal containing the article he wants to photocopy and pay the small permissions fee associated with it," Riordan said.

The center routes patron requests and maintains its author/publisher data base through Finserv Computer Corp., a general service bureau located in Schenectady, N.Y. Information is processed by the bureau using an Itel Corp. AS/4 mainframe with 1M byte of memory. The computer system has a mixture of Itel and California Computer Products, Inc. disk drives with a combined on-line disk storage capacity of 2 billion characters.

Data is keyed in through Entrex Corp. 64K minicomputers, programmed to check user numbers and transaction validations, Robert Strain, director of the firm, said. Tapes produced by the minicomputers are input to the Itel machine in a batch mode and transferred to the appropriate records within the data base.

Confidentiality, as with any data base, is a prime concern, Strain stated. The system has an on-line query capability but "it's a restricted capability because it's a confidential-type file. User information per se is not available to the publisher and vice versa," Strain said, although "we will provide [general] details such as the number of photocopies that have been made or the dates of transactions."

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# Interactive Net to Help Students Pick Careers

**By Howard A. Karten**
CW Staff

MIAMI — The Dade County school system — fifth largest in the country — is planning a program of career counseling for high school students that will use computers and a specially written counseling program.

When the system goes live in September, students in 23 high schools will be able to interact with the district's IBM 370/158 to help choose careers, learn about various training resources and obtain other information relevant to academic preparation and job benefits.

The heart of the effort is a program from IBM called Discover. With IBM 3276 terminals attached to the 5M-byte mainframe, students will be able to indicate to the system their interests, likes and dislikes.

Occupations have been coded in six areas; the system selects likely occupations based on a student's interest profile. After the system has identified appropriate occupations, the student can browse through them on the terminal to find information about entry requirements, benefits, employment outlook in the future and related information.

### Two Advantages

What is the advantage of this approach over an older, nontechnical method of accomplishing the same thing? Alan Olkes, executive director of management information services for the Dade County school system and the person responsible for the system, cited two.

"We used to have one guidance counselor for every 200 to 250 students; now we have one for every 450 to 500 students. With the counselors' time divided up this way, there's no way they can give individualized guidance. What we're trying to do is look for a way technology can step in and do part of that job," Olkes noted.

The second advantage is that the students seem interested in the technology and, in particular, in its interactive aspect. "My own daughter, who's a senior in high school, was not motivated to read the printed material available, but sat completely fascinated for almost five hours with the terminal — I think because of the interaction with the system," Olkes said.

The Discover program, originally developed by the Discover Foundation, Inc. in Westminister, Md., is being run in five other areas of the country, according to an IBM spokesman.

Olkes' interest in the program began in 1972, when he saw the program in action at a school principals' convention. "I thought, 'Boy, if I could have this in my high school, just think of all the counselor's time that could be saved,' " Olkes recalled. However, the DP equipment the school had at that time could not support the program. When the school acquired the necessary computer power, Olkes forged ahead with the program.

### Other Plans for System

Identifying career interests is only part of the service that will be performed by the system. "The computer will display vocational and continuing education courses offered by the school system. This could give students a reference point to plan part of their high school curricula," Olkes said.

"And we're planning to have job listings carried by the Florida Employment Bureau on the system to help students find jobs that can help them in their careers," he added.

When school opens in September, each high school in the district will have at least two IBM 3276 terminals connected by dedicated phone lines to the computer center. To make the system easy to use, students will be presented with menus on the screen and will respond by using a light pen.

In addition, printers will be available to obtain hard copies of data selected by the students.

Discussing the beneficial impact of computers on instruction and on the students' motivation, Olkes can cite many cases of students motivated to work hard with the computer.

"We had one lower level math class where the students were learning fractions and they kept looking at the terminal and asking why they couldn't use it. The students wanted to do fractions on the system, but the teacher explained that 'the computer doesn't do fractions — it deals with everything in decimal.'

"One kid who had never had an interest in math got interested and came after school for a couple of weeks. He ended up writing a program in APL to convert decimals to fractions."

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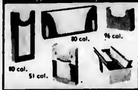

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# Editorial

## Everyman's Network?

AT&T's long-awaited Advanced Communications Service (ACS) [CW, July 17] may provide some important benefits to the DP/data communications user.

Until now, users relying on the major mainframe vendors for their CPUs and communications capabilities have had to deal with a proliferation of network architectures. Each of these architectures was promised — by IBM, by Univac, by Burroughs Corp. and the rest — as the ultimate solution to configuring cost-effective networks. But users realized most of these schemes were also designed to lock them into a particular vendor's equipment.

While these architectures were being touted as cure-alls by the vendors, standards were developing at a rapid pace. CCITT X.25 established the foundation and then, early this year, X.75 and X.121 were added to provide a framework under which packet-switched networks could operate on an international basis.

It is clear AT&T was watching the standards work with great interest. There is good reason to believe ACS became X.25-compatible only after the standards were adopted, while the various vendor-specific architectures were meeting with limited success.

The compatibility between X.25 and ACS means the supposedly shrewd mainframe vendors, including IBM with its highly touted Systems Network Architecture, will now have to turn about and make their communications schemes X.25-compatible. The risk of not embracing X.25 — and thereby eliminating compatibility with ACS customers — is a risk they cannot afford to take.

For users who have been holding off on selecting an architecture that could lock them in, the world will become a much more compatible place.

There are still many aspects of ACS that have to be investigated. Initially, however, the service appears to provide network options not available today to data communications users. The compatibility with X.25 could mean AT&T is dreaming of international interconnections for ACS. And if existing public packet nets are being interconnected via X.25, should ACS be handled any differently?

But the AT&T network clearly brings the Bell System into the DP arena. If a viable method can be found to allow AT&T to compete in providing terminals, the screams from Armonk, Blue Bell, Detroit and other mainframe capitals will be ineffective, no matter how loud.

The methodology seems to be in place for a type of 1980s version of everyman's network. Maybe AT&T Chairman John D. deButts is right — the System is the solution — but as far as users are concerned, compatibility is the key. AT&T seems to have been addressing the needs of most users with the initial information it released on ACS.

# Letters to the Editor

### Sign of Deeper Trouble

There is a law that if an organization has a lot of DP problems, it has worse problems somewhere else. This situation can be inferred from "Small Agencies Found Lacking Direction in DP" [CW, July 3].

"Decision making falls to middle level managers" who "frequently don't have a clear idea of the agencies' goals," according to the article.

Since DP is only a small percentage of the agencies' budgets, this lack of goal knowledge must hurt other areas of the agencies' business much more than DP.

C.H. Reynolds
Culver City, Calif.

### Talent Poorly Used

I read with interest the article by Jack Stone and Irene Nesbit on programmer job structuring [CW, July 3].

While there has been much talk of professionalism in the past few years, installations that manage their programmers as true professionals are extremely rare. I personally have seen only two or three.

A professional by definition is a self-directing, self-motivating, self-sufficient individual capable of managing his affairs without direct supervision. Translated into programmer job structuring, this means a programmer writes proposals and specs, prepares cost estimates and monitors the dollars he has spent on machine time, data entry and programming for development and production jobs. He also sets and observes standards, monitors quality and participates in department seminars — as well as doing programming.

Programmers operating in this type of environment are normally highly motivated and happy with their jobs.

Unfortunately, programmers in the majority of our computer installations are nothing more than glorified technicians who do nothing more than push a pencil for their managers. We in the computer field have to be the poorest utilizers of technical talent in history.

Professionalism? It's nonexistent.

P.A. Anderson
Chicago, Ill.

### Doubly Concerned

I wish to comment on two letters on Proposition 13 [CW, July 3] and on "Debug Views on DP Careers, Women Urged" [CW, June 19].

Concerning Proposition 13, did it ever occur to the individuals who criticized government DP centers and their personnel that we also pay taxes? As taxpayers, I can assure you that for the most part, we all work as efficiently as possible and use every bit as much effort, skill and professionalism as our private-sector counterparts. It is our money too!

My second concern is with the letters [CW, July 3] and article on women's DP careers. I am an executive in DP and have never felt the need to be anything other than a woman who earned the executive position because I was the best qualified to fill it. I do not emulate a "male" image and never have.

Some of the most obnoxious women I have met in business are the ones described by Dr. White. Some try to prove something based on the fact they are sure they have no choice but to "come on strong."

Doing a good job and being pleasant to work with will get you a lot farther.

Roberta Blanchette
Phoenix, Ariz.

# Data Past

### Five Years Ago
### July 25, 1973

WASHINGTON, D.C. — The computer world awaited the recommendations of a high-level government committee formed by Elliot Richardson to examine computers and privacy, particularly as impacted by personal data systems.

Sources close to the committee predicted stringent measures would be included in the recommendations to protect the privacy of people whose names were contained in personal data banks, such as those maintained for credit purposes and/or government assistance.

— — —

NEW YORK — A small basement courtroom in the federal district court here was the scene for the latest of the numerous inconclusive hearings on whether IBM should be fined for contempt of court for refusing to turn over documents to the government for use in its antitrust case. Even though the courtroom was new, the "script" remained essentially the same as in the past hearings.

### Eight Years Ago
### July 29, 1970

CINCINNATI, Ohio — FBI agents here accused 18-year-old Mark Steven Coffman of Cincinnati of long-distance theft of information from a Louisville, Ky., time-sharing computer system. The government's charge was the interstate commerce of illegally obtained property. The victim of the alleged theft was Metridata Computing, Inc. of Louisville.

— — —

NEWTON, Mass. — According to preliminary results of a continuing Computer*world* survey, IBM's System/3 was living up to the expectations of most users, although several registered specific complaints about both hardware and software. The majority of the early users were impressed with the price and hardware reliability.

## *The Human Connection*

# SEC Eyeing Ways to Aid Investing Climate

**By Jack Stone**
Special to CW

Most of you who are witnessing the hordes of newcomer companies flailing about in the marketplace — particularly at the micro/mini systems levels — have never been part of the entrepreneurial scene and may be wondering if you, too, are missing the boat to glory, power, fame and riches through the channel of the public stock offering.

Well, I've had some experience in the area and, because of some recent developments at the U.S. Securities and Exchange Commission (SEC), rumblings in Congress and mergers that have hit the industry lately, I thought that it would be interesting and timely to discuss an improving climate for public offerings.

First, here is a brief tutorial about strategies for making a bundle from the sale of stock to the public. For those of you who have your millions, just skip ahead a few paragraphs.

The idea is to build a "going concern" — a corporation that consistantly makes a growing profit with increasing sales (exclusive of legitimate R&D expense which, in the case of software companies, may sometimes raise legal questions).

During the development period, a key goal is to keep all stock in the hands of the founders both to keep stock dilution at a minimum and to control the decision to sell the stock. Most times, though, the founders either can't or won't come up with additional cash when the needs for expansion or mere survival require it.

At such milestones, the founders face critical choices: should they scrimp along and maintain control of the stock or should they search for a buyer for part of their stock holdings to raise the needed capital? If the decision is to take the latter route, then the next objective is clear: to sell the smallest amount of stock at the highest possible price and thereby maximize the dollars available for the business plus increase the value of the shares remaining in the hands of the founders.

### 'Grand Master'

Of course, the grand master of the game is Ross Perot of Electronic Data Systems fame who parlayed an inconsequential investment into a multimillion-dollar service-bureau-type business and kept total stock ownership throughout the growth years.

After he made the decision to sell some stock for expansion, he searched for nearly a year before he found an underwriter who would place the stock in public hands.

He wound up selling a pittance of his holdings for millions and thereby ran up the value of his remaining holdings to around $1 billion or so, give or take $100 million, were he able to sell it. (He's fallen on bad times as of late, as the value of his stock has plummeted to about $90 million, more or less.)

But the SEC has very strict rules that prevent insiders from reselling their stock, termed "restricted securities" in the brokerage trade. The rules were instituted as a result of gross excesses of small high technology (and other) companies in the past.

In latter years, these companies produced glowing but overstated reports of their performance and prospects to prospective outside investors, sold large blocks of insider stock at highly inflated prices relative to value and literally ran off with the dough. Now, the founders must submit to a complex, expensive, lengthy process of "registration" in which they are forced to document the true status of the company in a completely objective way.

But a chorus of recent complaints from small companies encouraged a series of hearings by the SEC this past spring on the impact of the commission's own rules upon the capabilities of the small, growth-oriented companies to raise capital through stock sales. The *New York Times* [July 4] reported on early conclusions about the testimony.

First, although small business generates about half of the gross national product, it reported that venture funds for small business are all but nonexistent. It even quoted SEC Commissioner Phillip Loomis Jr. as saying that small, innovative firms are becoming "an endangered species."

One problem has been the cost of filing required periodic reports with the SEC. The *Times* noted that the SEC itself figured that filing costs for small companies is about 40 times that of larger companies per $100,000 of sales. In addition, the paper said the Small Business Administration found that few underwriting firms will handle an issue of less than $3 million because of the high costs.

But the message may be getting across. Congress has gotten into the act. "A law was passed enabling small companies to offer up to $3 million in stock without having to meet all of the filing requirments of larger issues," the *Times* reported. "The Commission is also exploring other changes that would lower filing costs and allow more small companies to raise capital through private placements or to place stock through an underwriter with a few sophisticated investors."

If indeed the rules are relaxed, it may be timely for many of you to start thinking of free enterprise's glories.

*Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 30007.*

## *The Taylor Report*

# TRS-80 May Move Into Different League

**By Alan Taylor**
Special to CW

You would not expect that a piece of hardware could follow in the steps of software. But it's happening, unless I'm mistaken, and that piece of hardware is Radio Shack's TRS-80 personal computer, which is now just entering its second year.

Cobol is one of three "world standards" that have evolved in computing in the past 20 years because of diffusion, rather than because of ownership or excellence.

Such standards are sometimes established by ownership. The prime example is the IBM 360 and 360-compatible systems. These are certainly standard worldwide, having affected computer design and use from Japan to Hungary, and they are now part of the world history of computer development. But if on April 7, 1964, IBM had announced a virtual machine based on the then known concepts of the Burroughs Corp. B5000 or a hardware-based multiprocessing machine based on the concepts of the Honeywell Information Systems, Inc. 800 or had simply developed its own 1400 further, that IBM system would be a world standard by now.

There have also been world standards based on excellence. The concept of a removable disk pack is one example. It is used in configurations that are basically identical just about anywhere. And with a history going back to the '50s, it seems that the product's excellence, more than anything else, has put it there. Another such standard, though perhaps less important, might be the magnetic core.

### Diffusion Standards

But the standards I will discuss today are the "diffusion standards." Diffusion standards develop because a good idea has been so widely adopted that there is nothing the developers can do to prevent its escaping their control.

Fortran, for example, developed in the mid-'50s as a means for mathematicians to avoid having to learn assembly in order to use computers (particularly the IBM 650). Fortran took about 10 years to develop from being a proprietary language owned by IBM (mostly by its use in the Control Data Corp. 1604 and on the IBM 7090) to taking a permanent place in world program inventories.

A similar thing happened with Cobol. Originally a four-division business compiler, it was developed under the direction of Grace Hopper in a warehouse in North Philadelphia. The language escaped very quickly from its proprietary origin with the enlightened attitude of the Univac management of those days and was made public in 1959 under the name Cobol. The name change was necessary for the language to gain acceptance from IBM, HIS, NCR Corp. and other firms that had their own versions.

At one point, Cobol was slated to be replaced by another language, PL-1, but Cobol's strong acceptance worldwide was enough to turn back the threat — despite all the theoretical advantages of the later language.

This showed that it isn't just excellence that determines where diffusion standards go.

Another similar development showed its power when Basic erupted from Dartmouth College and took over the world's terminals. Again, there are superior languages, but there is only one Basic.

Such acceptance can only occur when price is low. There is no "world standard" in Rolls Royces, since there just aren't enough of them.

With Basics, Cobols and Fortrans there are quite clearly enough.

### New Example Forthcoming?

The TRS-80 may soon be prevalant enough as well. The development of the TRS-80, whose disks have only just started being shipped, six months late, may — I repeat may — erupt in a similar fashion. We should know within 18 months, but the signs are here already.

The significance of the TRS system has already been discussed in this column [CW, May 8]. I noted the system's potential for becoming much more than a toy.

But beyond its value as a system, the TRS-80 is looking to be the first computer to expand beyond the realms of its originators just as Cobol, Fortran and Basic did.

Signs of this can be seen in the growing number of user groups and much more in the types of development and operations of the TRS-80 that these groups are building as contrasted with the types of development coming from Radio Shack. This is not to criticize the manufacturer. There is a great deal of difference between producing a single piece of hardware and offering a product line across the country.

In particular, users have gone ahead of the manufacturer and connected the necessary hardware for producing upper and lower case characters and for intelligent terminal use.

And these users (and the little firms that are springing up) will continue their projects. So the TRS-80 is behaving as if it, like Cobol, can jump the ownership boundary.

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# Letters to the Editor

## Unexamined Facts On Firearms Issue

It's unfortunate that Computerworld didn't contact someone besides a spokesman for the Bureau of Alcohol, Tobacco and Firearms (BATF) for "Firearm-Tracking Proposal Meeting Opposition" [June 19].

Further research would have revealed the following:

The proposed serial number contains a code for barrel length as well as caliber, data superfluous for any tracing ability but perfect for establishing ownership of ill-defined "Saturday-night specials," which our President desires to "control" (read "ban").

BATF has been boasting for years that it can trace a gun in minutes: that of "Son of Sam" took 42.

The bureau claims the power to computerize presently required records of retail sales, containing not only serial numbers which could be matched against the new reports but also such things as place of birth, sex and race of all purchasers since 1968.

BATF's own estimates would result in 25 million computer entries per year for new guns alone, plus transfers of used guns and theft reports, which it has the gall to maintain would cost less than $5 million, obviously expecting to receive whatever funds are needed once the program is begun.

Ten years after enactment of the Gun Control Act of 1968, the Bureau still refuses to define the meaning of "engaging in the business" of firearms dealing, preferring to leave application of the $5,000 fine and/or five years' imprisonment penalty for doing so without a license to the whim of the current Administration.

Past enforcement of this act and other laws by the bureau — including entrapment, illegal search and seizure and beatings and shootings of the innocent — is hardly an endorsement for a computerized base inviting still further abuse.

The vote in the House to prevent funding of the proposals was 314 to 80, prefaced by numerous speeches showing they were recognized as an end-run around the repeated rejection of a centralized system by Congress, which never intended BATF to have "an overall picture of trends or general activities" regarding firearms.

George L. Wancura
Island Pond, Vt.

## View on Education: Extensive Confusion

I read the recent editorial "A Sad State of Confusion" [CW, May 22] with great interest. I couldn't agree more with the basic premise that computer science and DP aren't the same thing and shouldn't be the same thing.

The confusion is even more extensive than was indicated, as can be seen by Hamblen's study "Computer Manpower Supply and Demand by States — 1975" in which he tried to classify computer-oriented programs in relationship to their subject matter and within what department of the university or college they were housed. He came up with more than 50 classifications, the more common of which were computer science and accounting, computer science within the business school, computer science within the math department and computer science within engineering.

I feel there are three basic areas for training DP professionals at the university level to include computer engineering/technology, computer science and information systems.

The computer engineering/technology program would most likely be housed in the electrical engineering department and would emphasize the design and architecture of the computer itself.

The computer science program would be part of the school of science and most likely be housed in the math department and would emphasize optimizing what can be done with the computer.

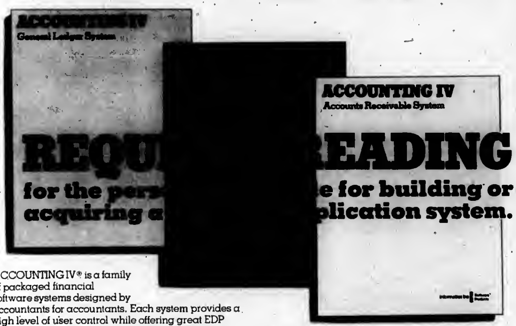
The DP or information systems program would be housed within the business school and would emphasize how the computer can be an aid to managers in solving their information-based problems.

Within this general classification, the various computer-oriented degree programs can be seen as aiming at significantly different segments of the DP professional market. Further, the types of faculty and students who are attracted to these programs should have highly different orientations.

Because of the confusion within industry and the university and college community about the unique orientation required and desired for DPers, we decided to take the lead in trying to do something about it. We are planning a national conference/workshop in Los Angeles next February dealing with the development of a curriculum specifically designed for producing the programmers and analysts needed in the commercial DP environment.

I know there are many people who feel a need for this type of orientation. What is needed now is a forum so these people from across the country can form a critical mass to further this concept.

Thomas H. Athey, Chairman
Information Systems Department
California State
Polytechnic University
Pomona, Calif.



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## *Offers Four Modes of Control*

# Large User Finds Tool to Stem Accesses

**By Don Leavitt**
CW Staff

LONDON, Ont. — London Life Insurance Co. has a large-scale DP operation — an IBM 370/168 running under OS/MVS 3.7 and a substantial utilization of IMS — and the classic problems of protecting sensitive data files from unauthorized access.

But the company also has a tool that seems well on its way to providing the data security the company needs in the way the company wants. The Access Control Facility (ACF2) software recently introduced by The Cambridge Systems Group is "quite a product," according to consulting technical analyst Ron Murray.

In the first place, he said, the system can be brought up in stages so all concerned can get used to the way it works. There are, in fact, four modes of control; having started to use ACF2 in March, London is running under the second, or transitional log, mode.

It started in "silent" mode, during which the software tracks all accesses to protected data sets but "doesn't do anything about violations" of security rules. The log mode goes further, reporting security breaches "but not taking any action to stop them."

The third mode permits the operations staff to decide on a case-by-case basis whether to allow access when it violates one of the preset rules. The fourth mode "simply cancels any job in which an access rule violation takes place,"Murray explained.

The transitional log mode provides an audit trail of accesses to the sensitive files; this facilitates the construction of ACF2 rules that allow the sharing of data between users once full security is on, he continued.

The word "rules" indicates another difference between ACF2 and more conventional security systems, the analyst pointed out. The Cambridge Systems package automatically secures all data while providing algorithmic access control language for allowing the sharing of data, right down to the program path to the data, Murray said.

ACF2 does not use passwords or comparable defense mechanisms, relying instead on rules developed by the system implementors.

At the time it first considered the Cambridge Systems product, London Life also evaluated IBM's Resource Access Control Facility (RACF). The company chose ACF2 because of the way it functioned, the data and system access report generators it included and its general user orientation, Murray said last week.

He added, however, that his tests were run against Version 2 of RACF and the results might be different if he'd been able to try the very recently introduced Version 3 which, he believes, overcomes a number of the problems he'd seen in the earlier packaging.

He labeled as "significant" the backup and recovery facility ACF2 provides for the user access authorization file "which obviously can be lost from time to time." The system can reach back to its own history file to determine what access rules were in effect when the authorization file was lost.

Developed by Schrager Klemens and Krueger, Inc., the ACF2 package has been well supported by Cambridge and has not had any noticeable effect on system performance, according to Murray.

Now ready for general distribution and installable through IBM's SMP facility, ACF2 can be leased for $600/mo with purchase and multiple-CPU plans available, Cambridge Systems said from 19857 Beekman Place, Cupertino, Calif. 95014.

# DG Options for Eclipse Users Include Cobol, RPG, Others

WESTBORO, Mass. — Commercially oriented users of Data General Corp.'s largest Eclipse minicomputers now have more options under DG's Advanced Operating System (AOS) with the addition of a full ANS Cobol, RPG-II and a trio of other packages introduced here last week.

The company's Interactive Data Entry/Access (Idea) application development tool, Infos file management system and a substantial sort/merge utility — as well as the Cobol and RPG — were previously available on DG's Eclipse C/330 under RDOS "so they are proven products," a spokesman claimed.

Now both the C/330 and the more recent M/600 can support, under AOS, a total of nine languages, a pair of IBM-compatible data communications utilities, a file manager with data base orientation and the sort/merge facility, he said.

In addition to Cobol and RPG-II, the AOS repertoire includes a "streamlined subset" of PL/I that is said to conform with the American National Standards Institute draft standard now out for review, an Extended Fortran IV and DG's optimizing Fortran 5.

Multiuser and single-user Extended Basic, a structured system programming language (DG/L) and a macro assembler are also available, the spokesman noted.

Although there would be no difficulty in shifting work from a C/330 to an M/600 if both are equipped with AOS, conversion from an RDOS environment to AOS requires some effort but is made simpler, the spokesman claimed, by reformatting routines provided by the vendor.

Already installed at various beta test sites and scheduled for customer shipments in October, the AOS Cobol and Idea each cost $4,000; Infos costs $2,500; RPG-II, $1,500; and the sort/merge package, $750.

The languages include compilers and runtime libraries. DG is headquartered on Rt. 9 in Westboro, Mass. 01581.

## *For Manufacturers*

# HP 3000 Programs 'Unbundled'

PALO ALTO, Calif. — Three application modules designed for Hewlett-Packard Co. 3000 systems supporting manufacturing operations are now available separately or as an integrated package called MFG/3000.

The on-line modules enable users to improve inventory management, control costs and obtain more timely and accurate data on which to base purchasing and manufacturing decisions, according to a spokesman.

MFG/3000 is made up of:

- Engineering and Data Control (EDC/3000), which creates and maintains bills of materials and labor.
- Inventory and Order Status (IOS/3000), which processes material issues and receipts, maintains planned and released orders, manages planned issues and provides current balances for all inventory items.
- Materials Requirements Planning (MRP/3000), which plans orders based upon projected demand.

Access to information is easy, efficient and flexible, he claimed, pointing out that MFG/3000 works through HP's Image data base management system and the related Query facility. These require an HP 3000-II with a minimum 256K-byte memory.

With on-site consultation (and software service when appropriate), user training and support encompassing documentation and a telephone consulting service, each module costs $5,000 plus $150/mo.

They are available only in North America, the spokesman said from HP offices at 1501 Page Mill Road, Palo Alto, Calif. 94304.

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# 'PMD' Aids Management Of Residential Property

VALLEY FORGE, Pa. — The Property Management Department (PMD) package now available from Management and Computer Services, Inc. (Macs) was written for use on the IBM System/32, but the source language is RPG-II.

PMD provides everything the residential property manager needs to manage the business, control cash flow and maximize profits, a Macs spokesman claimed, adding that in its present implementation the package can work with 50 to 40,000 managed units.

PMD provides tenant status reports, an income statement and income summaries, he said.

Other output includes disbursements by general ledger account, cash disbursements, cash collection reports, cash settlement reports and lease renewal lists. Property owners may wish differing charts of accounts and PMD has that flexibility, the spokesman asserted.

The system is oriented toward supporting the non-DP-trained manager working at a CRT keyboard. It provides a menu of operations.

Source code for the System/32 implementation costs $6,150, the spokesman said, adding that adaptations for other small systems are expected to be available near year-end.

Macs is at 790 Valley Forge Plaza, Valley Forge, Pa. 19482.

# *Univac 90/30 Users Offered Communications Software*

REXDALE, Ont. — Multitasking and resource management facilities as well as an integrated file control system are said to be some of the features in a communications software package developed by the Allinson-Ross Corp. for Univac 90/30 processors.

The transaction interface processor (TIP/30) operates under Univac's OS/3 and TCI/Icam and contains support programs that aid the user in the development, debugging and documentation of on-line applications, a spokesman said. The software incorporates a main-line or monitor program, composed of one primary and two major subtasks, to expedite multitasking operations. It controls and schedules user service requests by performing data management or communications I/O calls through the operating system or communications control software.

The software's file control system is said to resolve contingencies that arise when multiple users request I/O functions to be performed against the same file. The system services requests on a first-in, first-out basis and will queue the request if a user is required to wait, the spokesman added.

TIP/30 also contains a command processor program that provides job control-like functions to the user in controlling his on-line environment and scheduling activities. The program, loaded for the user to initiate work from a terminal, features system access security, general and master functions and user program load and abort facilities, he said.

A series of operator commands which may be entered as unsolicited messages to the communications program from the operator's console are also included, the spokesman pointed out.

The software also has a system escape feature, a system development library, a catalog file of relevant user information and a limited games library.

TIP/30 costs $13,500 or $375/mo, the firm said. Information and further documentation is available from P.O. Box 361, Rexdale, Ontario, Canada M9W-5L3.

# 'Quikjob III' On 90/60 CPUs

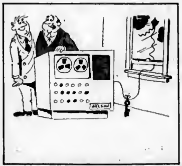
DAYTON, Ohio — A version of Quikjob III report writer and file handling software from System Support Software, Inc. (SSS) is now available for use on Univac 90/60 and larger CPUs under VS/9 environments.

Originally developed, and still available, for IBM 360/370 users, the software is described as "a simple but powerful tool designed to minimize programming time and effort for the myriad of instances when you want to fix a file, prepare a report or generate test data."

Quikjob III can and is being used as the application programming language of choice in numerous production environments, a spokesman added.

Although the initial Univac-oriented version was designed for the larger Series 90 systems, SSS indicated a version for the low end of the Series 90 spectrum, under OS/3, is being considered.

The VS/9 packaging costs $7,500, the spokesman added from 5230 Springboro Pike, Dayton, Ohio 45439.



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# DP Cost Trade-Off Leaning In Favor of APL Programs

**By Peter Meekin**
Special to CW

APL represents a departure from other procedure-oriented languages such as Fortran, Cobol, Algol and PL/I. A very large set of primitive functions, lack of a hierarchy of operations, a workspace environment, built-in array processing capabilities and a consistent syntax all set APL apart.

Another unusual aspect of APL as it is currently implemented is its interpretive nature. When an APL program is run, each line of code is scanned to determine which operation should be carried out next and which data items are involved.

*Written independently of Joseph Schengili's "Checklist Shows If APL Is Suitable Language" [CW, May 8], this article nonetheless tends to explain why the characteristics in Schengili's checklist were rated as they were. Meekin is a senior partner with Compro Associates, a software and consulting firm in New Paltz, N.Y.*

After the appropriate routine to perform the operation is invoked and completes its task, the operation next in line is examined and the process continues.

Any program written in a high-level language must be translated into machine instructions for actual execution. But while a compiler produces a machine language equivalent of a batch source program which may then be run many times without further translation, a line of APL code must be interpreted each time it is executed.

Thus, a program written in Fortran will require the overhead of translation only when compiled, while an APL program requires that overhead during each execution.

The overhead resulting from APL's interpretive nature presents a fundamental problem. For a trivial operation, the time used for interpretation may exceed that required to actually perform the work. However, this problem may be mitigated by other important aspects of the language.

In particular, APL's large set of primitive functions includes many powerful operators for calculation and data manipulation. For example, native functions are available to provide array rotation and reversal, sorting, matrix inversion and a great many other operations usually requiring many statements in other languages.

Since these APL functions can be applied to large arrays, complex algorithms requiring many statements and an iterative structure in other languages can be expressed as a single line of APL code.

The overhead generated while interpreting an expression of this type is therefore insignificant when compared with the work actually performed. This fact is critical in determining the relative efficiency of an APL application.

This balance between language features of wide scope and power and the inefficiency inherent in an interpretive process is the basis for application selection criteria. It is the main factor influencing the relative cost of development, operation and maintenance for an application implemented in APL vs. a compiled mode.

### Selection Criteria

The high-level nature of APL can lead to dramatic differences in development cost. Reductions of as much as 90% in the cost and time for new system implementation have been reported. This fact is particularly significant given the cost of analysts and programmers.

Also, provided good coding practices and documentation standards are followed, the cost of maintenance and modification of APL applications is

(Continued on Page 26)

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## *IMS Users Get Test System*

SACRAMENTO, Calif. — The Test/IMS package from Software Module Marketing (SMM) is a full facility, on-line test system for programs running under IBM's Information Management System (IMS), according to its vendor.

Unlike some testing systems that "blow up" when the first error is encountered, Test/IMS supports "session" testing, allowing many different, unrelated program errors to be identified in a single test session, increasing programmer productivity, according to SMM.

The package supports the verification of DL/1 Call parameters, the checking of DL/1 status codes and the printing of IMS and program interface information. In order to get past the first error condition, Test/IMS "obviously" supports interception of Program Exception Abends, a spokesman observed.

The package also provides a method of isolating the test and production environments, ensuring that testing is always done against test data — never live data — and increasing overall system reliability and security, he said.

Without providing any specific information, he asserted also that Test/IMS requires far less CPU and peripheral resources than any other comprehensive test method.

The package sells for $12,000 from SMM in the Crocker Bank Building Penthouse, 1007 Seventh St., Sacramento, Calif. 95814.

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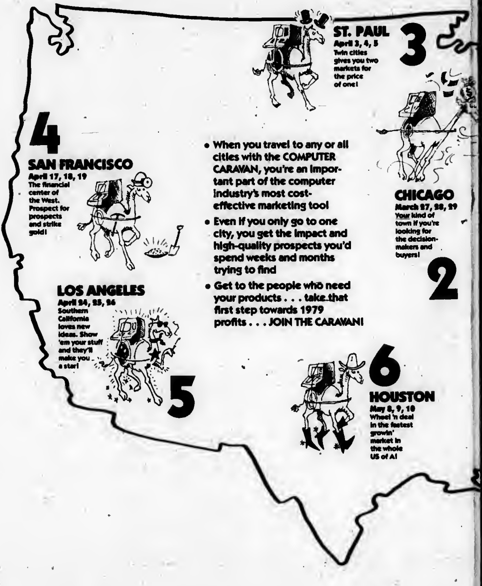
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# *Trio of Utility Packages Aimed at DEC PDP-11 Users*

PALO ALTO, Calif. — Stanford Systems Corp. has introduced several systems utility software packages designed to be used with Digital Equipment Corp. PDP-11s.

The first, a Pascal compiler based closely on Jensen and Wirth's revised (1975) report, offers the following extensions: a separate module compilation mechanism, a cross-reference and indented source listing and a common declaration source library.

The second product functions under DEC's RT-11 or RSX-11M operating systems and allows the mini to emulate an IBM 2780 terminal, the spokesman claimed. The package requires an associated DU-11 or DUP-11 synchronous communications interface and performs in either Ascii or Ebcdic.

Finally, the firm unveiled communications software that allows the PDP-11 to emulate a Control Data Corp. 200 UT terminal. The UT2 is designed to be used to gain access to the computational power of a CDC mainframe from a site with a PDP-11.

The Pascal compiler costs $3,800 while the 2780 emulator and UT2 are priced at $3,000 each from the firm at Suite 605, Stanford Financial Square, 2600 El Camino Real, Palo Alto, Calif. 94306.

# Royal Adds Cobol Compiler For Use on IBM Series/1

TUSTIN, Calif. — A Cobol compiler said to be in compliance with ANS Cobol 74 Level 2 specifications will be ready for IBM Series/1 minicomputer users in October, according to the vendor, Royal International Systems.

The software will compile and execute programs under IBM's RPS environment, a spokesman said, adding that the package includes optionally supported Cobol elements such as Report Writer and Sort/Merge.

The system consists of a disk-resident Cobol compiler, an object module support library and a stand-alone Sort program. The system will run under RPS version 1.1 with a minimum partition of 28K bytes, he said.

With delivery of the first release still several months away, Royal has already announced plans for a second release, in January, to include support for the Cobol communications requirements and an IBM 370 cross-compiler, for delivery in February.

The cross-compiler release will provide object modules for either the Series/1 or any of IBM's 360/370 mainframes. It will execute on the full-sized gear under OS/MVT, OS/VS1 or VS2, the spokesman explained.

The October release of the system for the Series/1 will cost $1,745/year with discounts for multiple installations or for execute-only use.

Royal International Systems is at 222 Fashion Lane #208, Tustin, Calif. 92680.

# Harris Unveils Multiuser APL

FORT LAUDERDALE, Fla. — The Harris Corp. has introduced an APL language that is said to expand the capabilities available for users of its virtual memory operating system.

Harris APL, functionally based upon APL shared variables, is designed to handle multidimensional arrays as single values and allow the use of data files created by other languages, a spokesman said. File I/O is managed by a system function that provides data management and manipulation abilities outside present APL workspaces, he added.

Harris APL also features a text editor, calculator mode and debugging functions, the spokesman continued. System commands can be implemented to maintain libraries, perform status displays, send messages to other users and communicate between programs.

The system also contains a library of functions to assist in file manipulation, the spokesman stated.

The multiuser language sells for a one-time license fee of $14,000 and carries an annual maintenance fee of $1,200 after the first year of installation. Harris Corp. is located at 1200 Gateway Drive, Fort Lauderdale, Fla. 33309.

# Reports Investigate State of the Art

PENNSAUKEN, N.J. — Auerbach Publishers, Inc. has released eight reports in the Infotech Computer State of the Art Report series.

The reports concern structured analysis and design, system reliability and integrity, minis vs. mainframes, data base technology, future networks, future programming, IBM and microcomputer systems, a spokesman said.

Each report is divided into two sections. An analysis section presents the facts, opinions, discussion and arguments of various authors, and a section of invited papers is a forum for internationally recognized industry leaders, the spokesman explained.

The reports are priced at $260 each or $1,470 for the entire series. A 28-page catalog is also available free from the publisher at Department 101, 6560 N. Park Drive, Pennsauken, N.J. 08109.

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# DP Cost Trade-Offs Leaning to APL Programs

*(Continued from Page 24)*

similarly reduced.

These benefits can be outweighed, however, if the ongoing operational cost for an application implemented in APL is significantly higher than a compiled implementation. If an application requires an approach in APL which will lead to a high proportion of processing expended for interpretation rather than actually accomplishing the given task, then that implementation will often be inefficient when compared with a compiled approach.

This situation usually stems from the fact that some processes require an iterative algorithm for practical implementation. The use of Fortran-like looping requires that the same lines of APL code be interpreted many times. If the real work performed on each pass is small, then the relative interpretive overhead will be high.

Systems which require many I/O operations to process data files will often lead to iterative program structures. The penalty in this situation is compounded by the additional overhead of many currently available APL file access methods when compared with other methods.

The relative cost for development, operation and subsequent maintenance and modification are then the main criteria for application selection. If properly employed, APL offers the possibility for substantial savings in developmental and maintenance cost.

Some factors influencing development costs are application complexity, clarity and precision of specifications and availability of existing systems which could be modified to fit the new requirements. An important factor in expected cost for maintenance and modification is the susceptibility of the application to changes in user requirements.

### Operational Cost

Estimating operational cost requires enough preliminary design to outline some broad aspects of a typical run of the proposed implementation. A design which includes a high degree of computation in a form not directly provided by the primitive functions or which does not benefit from the available array handling capability for data manipulation will usually be inefficient.

Applications employing extensive iteration or requiring bulk processing of large data files are particularly vulnerable to this type of problem.

Once the efficiency of the implementation on a per-run basis is estimated, the long-term operational cost is calculated given the expected level of usage. Clearly, the penalty for even a moderately inefficient approach might be unacceptable, given high usage, while a very inefficient implementation run monthly or quarterly may be tolerated.

### Application Analysis

Some questions useful for analyzing applications for APL acceptability are:

- Is an interactive or on-line capability required?
- Will all data and programs fit into a workspace?
- If files are required, can all the data involved in a typical run be accessed using a moderate amount of file I/O?
- Will the data be in an array structure which can be efficiently worked with or will it consist of many separate components which must be operated on individually?
- Can the algorithm involved be structured in an efficient, noniterative fashion?

As with most things, cost factors are the main criteria used in determining whether to implement an application in APL. Certain unusual features of the language as it currently exists often lead to a trade-off between developmental and maintenance savings and higher long-term cost of operation.

It should be noted that as machine-related costs go down and people-related costs increase, the range of applications appropriate for APL will widen.

Copyright 1978 by Peter Meekin

# NCR Mini Gets Lab Data Helper

DAYTON, Ohio — NCR Corp. has unveiled a software package for users of its I-8200 line of computers that can process information generated in medium- to large-scale hospital laboratory environments.

Written in Cobol 74, the system monitors and tracks the flow of information during an entire laboratory procedure, a spokesman claimed. This includes requesting the test, drawing samples, logging medical data, listing the work, performing the test and calculating, recording and presenting the results for the final report.

Data associated with various laboratory tests is entered via a CRT terminal; files are updated as information is received and entered into the system.

The system generates activity lists to accommodate work schedules and can produce reports which list the current status of lab work on each patient, the status of outpatient tests, microbiology test summaries and reports which summarize lab charges, the spokesman continued.

The package requires at least 64K bytes of memory for operation, he added.

The hospital laboratory software sells for a one-time fee of $8,000 from NCR at S. Patterson Blvd., Dayton, Ohio 45479.

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## In Datapro User Survey

# USTS, MCI, Telenet Facilities Rank Tops

**By Brad Schultz**
CW Staff

DELRAN, N.J. — United States-Transmission Systems (USTS), MCI Telecommunications Corp. and the Telenet packet network had overall best showings in a recent Datapro Research Corp. poll of user experience with data communications facilities.

The users rated the facilities in four categories: "reliability of operation," "quickness to troubleshoot and correct problems," "ease of installation" and "technical support."

The carriers and services were awarded from 1 to 4 points by each user, with 1 representing poor and 4 excellent.

In terms of weighted averages, USTS — an ITT subsidiary — ranked first in reliability (3.7) and quickness to troubleshoot (3.4) and third in technical support (3.2).

MCI's leased voice-grade lines were rated second in installation ease (3.3), second in reliability (3.6), third in troubleshooting (3.1) and fourth in technical support (2.9). "Other and unspecified" MCI services placed first in installation ease (3.5) and fourth in troubleshooting (3.0).

The Telenet packet network measured second in installation (3.3) and third in reliability and troubleshooting (3.5 and 3.1, respectively).

Lumped together as one type of carrier/-service, leased telegraph-grade lines other than those of the phone companies or Western Union topped technical support (3.7) and took second in installation and troubleshooting (3.3 for both).

Another strong shower was RCA satellite channels, which matched USTS' first place average of 3.7 points in the reliability category.

### High Reliability

Datapro's results indicate that communications users have an attractive array of vendors available to them in terms of reliability, since that category yielded a high ranking

(Continued on Page 32)

# Micro Business Phone Has Eight-Digit Display

SANTA CLARA, Calif. — A telephone with a built-in microprocessor and an eight-digit numeric display, claimed to be the first of its kind commercially available, has been announced by Rolm Corp.

The instrument is the precursor of a desk telephone which will be able to perform such functions as data entry and retrieval, interfacing to word processing devices, electronic mail transmission and credit card verification, according to a Rolm spokesman.

**Rolm ETS 100**

The ETS 100 is said to be suitable for replacing all multiple-key business telephones and is designed for use with the Rolm CBX computerized business telephone system.

The device reduces cost by showing elapsed time on toll phone calls — which should reduce the length of such calls — and by allowing moves and function changes on extensions to be made more quickly, a Rolm source claimed.

The digital display enables messages to be left electronically on an individual's phone, the source added. If the called party does not answer, the caller can lease a message such as "Call 2376," where 2376 is the caller's extension, the source explained.

New lines can be added to an existing ETS, extension numbers changed and functions modified by typing instructions on a terminal connected to a Rolm CBX — with no required change in hardware, the source continued.

The spokesman added that a service person using the maintenance teleprinter can customize function buttons, switch around extension numbers or restrict telephones to internal or local calls only.

A feature called "group pick up" is said to

(Continued on Page 35)

## Under FCC Program

# Connection Options Outlined

**By Mickey Schenberg**
Special to CW

Independent manufacturers typically supply registered data couplers to match any or all of AT&T's data access arrangement (DAA) types and also offer registered modems for direct connection to the switched network.

With either registered couplers or direct-connect modems, the telephone company must still supply and install standard data jacks. These jacks provide the direct connection to the telephone line and are intended to permit easy and immediate disconnection of data terminal equipment without interference with other equipment connected to the network. They are identified by a Universal Service Order Code (USOC), which must be specified when ordering the standard jack arrangements from the telephone company.

*Last week, the author described the FCC's equipment registration program. In this conclusion of the two-part series, he discusses the jacks and connection arrangements available under program.*

Users have a choice of three connection arrangements — permissive, fixed-loss loop and programmable — each designed to ensure that the signal level received at the telephone company central office does not exceed -12 dBm.

With the permissive arrangement, the output signal level from the modem is fixed at a maximum of -9 dBm. Since the permissive jacks are the same 6-pin-capacity miniature jacks used for standard voice installations, this arrangement provides for greater mobil-

(Continued on Page 35)

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# CRT Handles 132 Char./Line

CAMBRIDGE, Mass. — The ECD Corp. Smart Ascii is said to be the first CRT-based intelligent terminal that can display full line-printer format up to 132 char./line. It can display up to 40 lines on its 15-in. CRT with up to 4,096 characters.

The standard font is the full upper and lower case Ascii character set, but by using the supplied font editor program, the user can design his own special characters, according to a spokesman.

The keyboard is flexible so the user can modify it to match a new character set; foreign language fonts can be implemented, he added.

The interface for the Smart Ascii does not require any special protocol from the host, ECD noted. It communicates via an RS-232 interface and looks like a printer/keyboard combination to the host. This allows for either direct hookup or remote use via dial-up lines with keyboard-selectable transmission rates from 110- to 9,600 bit/sec.

The Smart Ascii comes with a text-editing program that allows off-line editing and supports transmission of data at a character, line, or block level to the host. The Smart Ascii will also execute user-written Basic programs, ECD said.

The system consists of a control unit with 37K of memory, a 78-key keyboard, the 15-in. CRT and two mini cassette disk drives at a price of $7,900.

ECD Corp. is at 196 Broadway, Cambridge, Mass. 02139.

# Group to Study Data Encryption

WASHINGTON, D.C. — An X3/-Sparc Study Group to examine what commercial data encryption standards might be desirable is being formed by David J. Sykes of Honeywell Information Systems, Inc.'s Phoenix branch.

The American National Standards Institute (Ansi) Committee X3 is currently voting by letter ballot on the anticipated approval of the federal government's Data Encryption Standard (DES).

Further, the data communications technical committee X3S3 of Ansi is defining a project for "standardization of the interface between data terminal equipment and data encryption equipment," according to a spokesman for the Computer and Business Equipment Manufacturers Association (Cbema).

Sykes' group, called Sparc/Encr, plans two or three meetings over the next few months that will consider such topics as encryption algorithms, data communications encryption at various levels, hardware interfaces and storage media encryption.

Interested persons are invited to participate. The group's first meeting is slated for Aug. 2-3, beginning at 10 a.m., at Cbema headquarters, Suite 1200, 1828 L St. N.W., Washington, D.C. 20036.

All planning to attend are asked to notify the Cbema director of standards at the above address or by phoning (202) 466-2299.

# Communications Facilities Rated

(Continued from Page 27)

cluster of averages — with four at 3.5 or better.

The survey results seem rather argumentative in the areas of installation and troubleshooting, since the tallies under those headings are highly competitive, as suggested by the number of ties among the leaders.

The most clear-cut differences were revealed in the category of technical support, where there was a relatively wide gap between first place (3.7) and second (3.3), and only three contenders exceeded an average of three points.

The survey suggested that most users find their communications facilities relatively reliable and simple to install, but only moderately satisfactory in diagnostics and support.

In fact, support has apparently been dismal for customers of telephone companies other than AT&T/Bell. A "subtotal" average for carriers and services under that heading was found to be only 1.8.

The support "subtotal" average for all communications facilities offered by Western Union registered just 2.2. No type of carrier or service in any of the four categories of comparison measured as low as Western Union's TWX/Telex in the area of support, which Datapro put at 1.2 points — nearly the theoretical minimum.

### Survey Responses

Many of the 410 users responding to the survey rated more than one service, according to Datapro. In fact, a total of 919 responses were obtained for rating particular services, the research firm said.

In the table shown, a summary of responses from Canadian and overseas subscribers is included.

The survey also asked data network users to specify the type of hardware or software that caused them any problems in 1977. As a percentage of total responses, the most common problem area was modems (66% of responses), followed by terminals (60%), local loop (47%), host computer software (41%), host computer hardware (30%), and front-end software (27%).

The survey results are included in a Datapro feature report entitled "All About Data Communications Facilities." The report costs $12, the firm said from 1805 Underwood Blvd., Delran, N.J. 08075.

| Carrier and Service | Number of Responses | Reliability of Operation | | | | | Quickness to Trouble-Shoot and Correct Problems | | | | | Ease of Installation | | | | | Technical Support | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | WA | E | G | F | P | WA | E | G | F | P | WA | E | G | F | P | WA | E | G | F | P |
| AT&T/Bell System— | | | | | | | | | | | | | | | | | | | | | |
| Leased telegraph-grade lines | 45 | 3.1 | 11 | 29 | 4 | 1 | 2.5 | 7 | 19 | 13 | 5 | 3.0 | 5 | 29 | 7 | 1 | 2.4 | 7 | 12 | 17 | 7 |
| Leased voice-grade lines | 292 | 3.1 | 77 | 174 | 36 | 4 | 2.6 | 52 | 107 | 98 | 32 | 3.1 | 81 | 164 | 41 | 6 | 2.4 | 40 | 79 | 115 | 51 |
| Leased wideband lines | 60 | 3.1 | 15 | 35 | 4 | 3 | 2.6 | 10 | 23 | 21 | 5 | 3.1 | 17 | 34 | 7 | 2 | 2.5 | 9 | 20 | 19 | 10 |
| DDD (telephone network) | 211 | 3.2 | 66 | 115 | 23 | 3 | 2.7 | 39 | 84 | 66 | 16 | 3.2 | 70 | 113 | 25 | 2 | 2.4 | 30 | 59 | 64 | 30 |
| DDS | 10 | 3.1 | 4 | 4 | 1 | 1 | 2.4 | 3 | 1 | 3 | 3 | 2.9 | 1 | 7 | 2 | 0 | 2.2 | 2 | 1 | 4 | 3 |
| Subtotals | 616 | 3.1 | 176 | 360 | 66 | 12 | 2.6 | 111 | 234 | 201 | 64 | 3.1 | 177 | 347 | 82 | 11 | 2.4 | 88 | 171 | 240 | 101 |
| Other telephone companies— | | | | | | | | | | | | | | | | | | | | | |
| Leased telegraph-grade lines | 7 | 2.3 | 0 | 4 | 1 | 2 | 2.1 | 0 | 2 | 4 | 1 | 2.7 | 2 | 2 | 2 | 1 | 1.4 | 0 | 0 | 3 | 4 |
| Leased voice-grade lines | 47 | 2.5 | 8 | 24 | 14 | 1 | 2.3 | 4 | 16 | 15 | 12 | 2.9 | 10 | 24 | 11 | 2 | 1.9 | 1 | 11 | 17 | 17 |
| Leased wideband lines | 5 | 2.6 | 2 | 3 | 1 | 2 | 2.3 | 0 | 4 | 2 | 2 | 2.5 | 0 | 6 | 1 | 1 | 2.1 | 0 | 3 | 3 | 2 |
| DDD (telephone network) | 30 | 2.5 | 1 | 15 | 6 | 2 | 2.0 | 1 | 10 | 7 | 11 | 2.6 | 3 | 19 | 5 | 2 | 1.5 | 0 | 5 | 9 | 13 |
| Subtotals | 92 | 2.7 | 11 | 50 | 24 | 7 | 2.2 | 5 | 32 | 28 | 26 | 2.6 | 15 | 51 | 20 | 5 | 1.8 | 1 | 19 | 32 | 37 |
| Western Union— | | | | | | | | | | | | | | | | | | | | | |
| Leased telegraph grade lines | 39 | 2.5 | 4 | 15 | 9 | 8 | 2.2 | 2 | 14 | 13 | 9 | 2.5 | 4 | 21 | 10 | 4 | 2.2 | 1 | 16 | 12 | 9 |
| Leased voice-grade lines | 13 | 2.9 | 4 | 5 | 3 | 1 | 2.5 | 1 | 5 | 5 | 1 | 2.8 | 3 | 7 | 1 | 2 | 2.3 | 0 | 3 | 5 | 2 |
| Satellite channels | 7 | 3.0 | 0 | 7 | 0 | 0 | 2.7 | 0 | 5 | 2 | 0 | 2.7 | 0 | 4 | 2 | 0 | 2.1 | 0 | 2 | 4 | 1 |
| TWX/Telex | 5 | 2.5 | 1 | 3 | 0 | 1 | 1.9 | 0 | 1 | 2 | 2 | 2.4 | 1 | 2 | 0 | 2 | 1.2 | 0 | 0 | 1 | 4 |
| Other and unspecified services | 6 | 2.9 | 2 | 4 | 1 | 1 | 2.6 | 0 | 5 | 1 | 1 | 3.0 | 3 | 3 | 1 | 1 | 2.6 | 1 | 3 | 2 | 1 |
| Subtotals | 72 | 2.7 | 11 | 37 | 13 | 11 | 2.4 | 3 | 32 | 23 | 13 | 2.7 | 11 | 37 | 14 | 9 | 2.2 | 2 | 24 | 25 | 17 |
| MCI— | | | | | | | | | | | | | | | | | | | | | |
| Leased voice-grade lines | 15 | 3.6 | 9 | 5 | 0 | 0 | 3.1 | 4 | 9 | 2 | 0 | 3.3 | 7 | 6 | 2 | 0 | 2.9 | 3 | 7 | 3 | 1 |
| Other and unspecified services | 6 | 3.1 | 1 | 7 | 0 | 0 | 3.0 | 0 | 7 | 0 | 0 | 3.5 | 4 | 4 | 0 | 0 | 2.7 | 0 | 5 | 2 | 0 |
| Subtotals | 23 | 3.4 | 10 | 13 | 0 | 0 | 3.1 | 4 | 15 | 2 | 0 | 3.4 | 11 | 10 | 2 | 0 | 2.9 | 3 | 12 | 5 | 1 |
| SPCC— | | | | | | | | | | | | | | | | | | | | | |
| Leased voice-grade lines | 13 | 2.5 | 2 | 6 | 2 | 1 | 2.2 | 1 | 2 | 5 | 2 | 2.6 | 0 | 9 | 3 | 1 | 1.5 | 0 | 3 | 5 | 5 |
| Other and unspecified services | 10 | 3.0 | 4 | 3 | 2 | 1 | 3.2 | 5 | 1 | 3 | 1 | 3.0 | 2 | 5 | 1 | 1 | 2.3 | 0 | 4 | 2 | 2 |
| Subtotals | 23 | 2.9 | 6 | 11 | 4 | 2 | 2.5 | 6 | 3 | 11 | 3 | 2.7 | 2 | 15 | 4 | 2 | 2.0 | 0 | 7 | 7 | 7 |
| ITT/USTS services | 7 | 3.7 | 5 | 2 | 0 | 0 | 3.4 | 3 | 4 | 0 | 0 | 3.1 | 2 | 4 | 1 | 0 | 3.2 | 1 | 4 | 0 | 0 |
| RCA— | | | | | | | | | | | | | | | | | | | | | |
| Satellite channels | 3 | 3.7 | 2 | 1 | 0 | 0 | 2.3 | 0 | 2 | 0 | 1 | 3.0 | 0 | 3 | 0 | 0 | 2.7 | 1 | 1 | 0 | 1 |
| Other and unspecified services | 3 | 2.7 | 0 | 2 | 1 | 0 | 2.7 | 0 | 2 | 1 | 0 | 3.0 | 0 | 3 | 0 | 0 | 2.7 | 1 | 1 | 0 | 1 |
| Subtotals | 6 | 3.2 | 2 | 3 | 1 | 0 | 2.5 | 0 | 4 | 1 | 1 | 3.0 | 0 | 6 | 0 | 0 | 2.7 | 2 | 2 | 1 | 1 |
| Telenet Packet Network | 16 | 3.5 | 11 | 5 | 2 | 0 | 3.1 | 5 | 5 | 4 | 0 | 3.3 | 6 | 7 | 3 | 0 | 3.0 | 5 | 7 | 3 | 1 |
| Tymnet Packet Network | 3 | 3.0 | 1 | 1 | 1 | 0 | 3.0 | 1 | 1 | 1 | 0 | 2.7 | 1 | 1 | 0 | 1 | 3.3 | 1 | 2 | 0 | 0 |
| Privately built facilities— | | | | | | | | | | | | | | | | | | | | | |
| Voice-grade lines | 5 | 3.3 | 4 | 3 | 1 | 0 | 3.3 | 4 | 3 | 0 | 1 | 2.9 | 2 | 3 | 3 | 0 | 2.6 | 2 | 3 | 2 | 1 |
| Wideband lines | 3 | 2.7 | 1 | 1 | 0 | 1 | 2.3 | 0 | 2 | 0 | 1 | 2.7 | 0 | 2 | 1 | 0 | 1.3 | 0 | 0 | 1 | 2 |
| Other and unspecified facilities | 19 | 3.4 | 9 | 5 | 2 | 0 | 3.0 | 4 | 12 | 2 | 1 | 2.8 | 3 | 11 | 1 | 3 | 3.0 | 5 | 6 | 1 | 2 |
| Subtotals | 30 | 3.3 | 14 | 12 | 3 | 1 | 3.0 | 5 | 17 | 2 | 3 | 2.9 | 5 | 15 | 5 | 3 | 2.7 | 7 | 11 | 4 | 5 |
| Other and unspecified carriers— | | | | | | | | | | | | | | | | | | | | | |
| Leased telegraph-grade lines | 3 | 3.3 | 1 | 2 | 0 | 0 | 3.3 | 1 | 2 | 0 | 0 | 3.3 | 1 | 2 | 0 | 0 | 3.7 | 2 | 1 | 0 | 0 |
| Leased voice-grade lines | 3 | 2.3 | 0 | 2 | 0 | 1 | 2.0 | 0 | 1 | 1 | 1 | 2.7 | 0 | 2 | 1 | 0 | 2.0 | 0 | 1 | 1 | 1 |
| Packet switched services | 5 | 2.6 | 1 | 3 | 0 | 1 | 3.0 | 2 | 2 | 0 | 1 | 3.2 | 1 | 4 | 0 | 0 | 2.4 | 1 | 2 | 0 | 2 |
| Other and unspecified services | 6 | 3.0 | 2 | 5 | 0 | 1 | 2.6 | 1 | 3 | 2 | 1 | 3.1 | 3 | 4 | 0 | 1 | 2.2 | 0 | 2 | 3 | 1 |
| Subtotals | 19 | 2.9 | 4 | 12 | 0 | 3 | 2.7 | 4 | 5 | 3 | 3 | 3.1 | 5 | 12 | 1 | 1 | 2.5 | 3 | 5 | 4 | 4 |
| Canadian facilities | 5 | 3.4 | 4 | 3 | 1 | 0 | 2.6 | 1 | 3 | 4 | 0 | 2.4 | 1 | 3 | 2 | 2 | 2.6 | 1 | 5 | 0 | 2 |
| European and other facilities | 29 | 2.7 | 3 | 15 | 7 | 2 | 2.2 | 1 | 5 | 13 | 5 | 2.5 | 3 | 16 | 3 | 3 | 2.3 | 3 | 9 | 9 | 5 |
| GRAND TOTALS | 948 | 3.1 | 258 | 524 | 124 | 38 | 2.6 | 153 | 368 | 293 | 118 | 3.0 | 241 | 527 | 137 | 38 | 2.4 | 116 | 280 | 330 | 182 |

Legend: WA—Weighted Average; E—Excellent; G—Good; F—Fair; P—Poor
Weighted Average is calculated by assigning weights of 4, 3, 2, and 1 to the four ratings, respectively.

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Users' Ratings of Communications Facilities

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## *Yields Reduced Response Time*

# Concentrator Allows Smooth Bank Net Switch

HANOVER, N.H. — A data communications processor has enabled the Dartmouth Savings Bank here to convert its on-line network from a Boston-based thrift servicer to a new service bureau with no required change in teller procedures and no teller retraining.

The conversion has resulted in a significant reduction in response time, a dramatic increase in the quantity and quality of information available at the teller window and a degree of flexibility that was not formerly possible.

The successful conversion was designed and implemented by Banking Services, Inc. (BSI). BSI was formed by the savings bank and Northern Consolidated Industries, also of Hanover, when poor response time and declining service and flexibility forced the bank to explore alternatives.

After considering both inhouse and remote processing, BSI settled on Teleprocessing Business Systems (TBS) of Waterbury, Conn., as the new servicer. TBS runs a comprehensive thrift package on its IBM 370 and currently supports 200 terminals in 50 New England locations.

To gain maximum control over and flexibility with the bank's network of Burroughs Corp. teller terminals, BSI looked at concentrators from several vendors including Periphonics Corp. and Burroughs before selecting the latter's B776.

"We were very impressed with the 'soft' design of the B776 and considered it an advantage to avoid introducing a third vendor into the network," Frank Walton, systems developer for BSI, explained.

"One of our primary design goals was to implement a system that was easily changeable and readily adaptable to new terminals, new line disciplines and even new mainframes. The B776 is well suited to this type of environment since all of its functions are handled in one of two higher level languages, Network Definition Language (NDL) or Message Processing Language II (MPL-11)," he said.

In the B776, the NDL code is executed in a separate data communications processor and handles all of the physical aspects of the network. All message validating, logging, reformatting and routing functions are performed in the CPU under the control of the MPL-II code.

BSI's present B776 configuration consists of a 2 MHz central processor with 96K bytes of memory, one 10 MHz data communications processor capable of supporting up to 16 lines, 4.6M bytes of removable disk cartridge and a TC4000 console.

The system runs under the level 2.0 Master Control Program (MCP) and supports a 300 card/min reader and a 160 line/min printer for software development. The B776 communicates to TBS over a 2,400 bit/sec leased line using Bell modems.

At its service center, TBS operates an IBM 370/145 under DOS and CICS (releases 33F and 1.3, respectively) with a 370/148 used for concurrent batch operations and to provide backup for the 145.

According to Walton, the 370 treats the B776 as a slave in a multidrop environment. The B776 responds to single or multiple polls as if it were one or more IBM 3271 control units and each poll can be used by the B776 to service up to 32 terminals.

This technique greatly reduces the mainframe overhead associated with the bank's network. According to Kerry

*(Continued on Page 36)*

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# FCC Program's Connection Options Described

*(Continued from Page 27)*

ity of terminals and modems.

However, since the modem's output level is fixed, regardless of the length — and hence loss — of the subscriber loop, this arrangement can cause problems when the stations are distant from the telephone company's central office.

In the fixed-loss loop configuration, the output signal level from the modem is set at a maximum of -4 dBm. The telephone company measures the loss of the subscriber loop and adjusts the attenuation of a pad in the jack to make the total loss 8 dBm.

### Best Arrangement

Since it avoids the problems arising from the pad and the fixed modem output level, the programmable arrangement is generally considered the best.

This is accomplished by a resistor in the jack, the value of which is set by the telephone company on the basis of loop loss measurements. When the modem is plugged into the jack, its signal level is set automatically to the appropriate value by the resistor.

Since this is a different line interface from the one required with permissive or fixed-loss units, the modem must be designed to operate with the jack's programmability feature. Such modems may be connected to either programmed or universal jacks.

### Following Regulations

Users wishing to connect registered data equipment to the public switched network must follow certain regulations prescribed by the Federal Communications Commission (FCC). It's imperative that these regulations be followed completely, since errors of omission or commission could cause service delays.

First, the telephone company must be notified in advance as to which line(s) will be used for registered equipment.

For each piece of registered equipment, the user must provide the telephone company with the name of the manufacturer and the equipment model number, FCC registration number and the equipment's ringer equivalence number.

For independent equipment, the user must specify to the telephone company which standard jack arrangement is needed.

If the terminal equipment causes technical problems to the network, the telephone company will notify the user that a temporary discontinuance of service may be required.

Finally, if the phone company plans any changes to its facilities that might make the user's equipment incompatible with the network, it must give the user advance written notice so he can arrange to avoid interruption of service.

*Schenberg is product manager at General Datacomm Industries, Inc., Danbury, Conn. 06810.*

# Micro Phone By Rolm

*(Continued from Page 27)*

allow secretaries to answer any ringing extension. The ETS display shows which extension was picked up, so a secretary knows what department or individual name should be used in answering, another source explained.

With 2,000 words of programmable read-only memory and 256 words of random-access memory, the ETS 100 reportedly costs as much as most 10- or 20- button call directors. However, prices are set by distributors and may thus vary depending on the location of purchase, the firm said from 4900 Old Ironside Drive, Santa Clara, Calif. 95050.

**Larry Eaton, General Sales Manager
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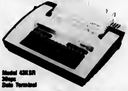

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# Concentrator Helps Bank Convert Successfully

*(Continued from Page 34)*

Donovan, a spokesman for TBS, the response of the Dartmouth Savings Bank terminals is as good as, or better than, that of any other bank in the network.

## Noticeable Changes

The bank's network currently includes TC1700, TC700 and TC750 terminals. Response time before the conversion was between 15 seconds and three minutes but now averages seven seconds.

"Because of the software we wrote for the B776, we were able to accept the identical transactions that the tellers had been using, reformat them into valid TBS transactions, package them in IBM 3270 protocol and ship them to Waterbury. By doing the reverse with the incoming messages, we didn't even alter the software in the Burroughs teller machines," Walton said.

By taking advantage of the new hardware flexibility and the combined information files at TBS, Walton has been able to provide several additional transaction types as well as CRT inquiry capability using Burroughs TD700 and TD800 terminals.

The TT602s will be installed in bank lobbies for direct customer inquiry into accounts and in several New Hampshire supermarkets as point-of-sale terminals using magnetic stripe readers and personal identification number keypads.

The B800 series provides software compatibility, so the B863 will be configured with data communications capability allowing it to be switched into the on-line network if necessary.

All software for the B776 was developed by BSI in the 12 weeks between the Aug. 5 arrival of the equipment and the Oct. 30 cutover to the new host. "Both the MCP and the compilers are fantastic," Walton commented. "We have not found a single fault in the system software in six months' time, including the four months of on-line operation, and according to Burroughs we are exercising some functions that may not have been used anywhere else."

The only significant downtime since the cutover was the result of a memory failure in the B776, and that was corrected by a replacement board. The impact of a host processor or phone line failure is greatly reduced by the presence of the disk unit on the concentrator since it is possible to store transactions for future processing.

The B776 will soon be replaced by a B876 running the level 2.1 MCP even though the current processor is experiencing a utilization rate of less than 10%. Walton explained that "the B876 will allow us to take advantage of several hardware and software enhancements, will provide important backup capability since we will retain the B776 and will allow software development to take place on the idle machine."

# Intershake Gets Storage Device

ALEXANDRIA, Va. — Atlantic Research Corp. has added the Intertape data recorder to the Intershake data communications test system.

Intertape is said to record both data and status control signals, regardless of line discipline. The unit can be used either as a portable stand-alone device with the Interview II stand-alone data monitor or with the Intershake test system.

The Intertape may be used for selective recording, as determined by the test program. For example, data from a specific terminal may be recorded, or protocol only may be recorded. Intershake will automatically start and stop the Intertape and add markers at significant points in the test, according to a spokesman.

Recorded data can be played back through the Intershake test system or displayed on the Interview II for off-line analysis. The Intershake automatically searches for significant markers and stops, eliminating tape searching, the firm said.

Intertape is available in two models — the ITU-1 desk model and the ITU-2 portable and rack-mountable model. Both are priced at $6,450 with 30-day delivery from 5390 Cherokee Ave., Alexandria, Va. 22314.

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## In Making CPU Upgrade

# Mapmaker Finds Independent Road Best

**By Howard A. Karlen**
CW Staff

SKOKIE, Ill. — When Frank Stubblefield Jr. decided to do something about his company's aging IBM 360/65 mainframe, he saw four options — add more memory, install an IBM 370/158 or 3031 or acquire a software-compatible system from an independent mainframer.

The director of information services for Rand McNally & Co. here began to investigate his options and, he recalled, heard "glowing reports" about the Itel Corp. Advanced Systems (AS). "Wait a minute, I've got to go out and visit some of these people and see if this is really true," he said to himself.

Partly as a result of those visits, Rand McNally acquired an Itel AS/3 Model 3; Stubblefield is obviously pleased with his decision. The 2M-byte machine running under IBM's OS/VS1 has been down "no more than two hours" since it was installed in March, he said.

Although Rand McNally is usually thought of as a mapmaker, maps account for only a small portion of its business. The 122-year-old company also publishes books, is believed to be the largest individual supplier of airline tickets in the country and is also responsible, in conjunction with the U.S. Treasury Department, for assigning the routing and transit numbers that appear in the upper right-hand corner of checks.

This diversity is reflected in the equipment the company has in its computer room. Complementing the Itel mainframe are Storage Technology Corp. tape drives, a Xerox Corp. 1200 printer, IBM 1403 printers, Courier Terminal Systems, Inc. CRTs and Itel disk drives.

### Quick Search

The company's investigation of replacements for its 1M-byte IBM 360/65 lasted only a month before it became apparent to the company that buying the Itel machine made the most sense, Stubblefield recalled.

"The Model 65 had been a damn good machine in its time, but we were faced with a number of major development projects and some rewrites of the present system, as well as some manufacturing applications that we had to take a look at," he said. "Growth and a concern for productivity and capacity were the main reasons for the switch.

"We needed more testing time and faster turnaround. In addition, we were getting to the saturation point with the Model 65," he added.

Since Rand McNally liked IBM software, it considered four possible options: adding more core to the Model 65 or installing a 158, a 3031 or the Itel system.

The first choice was quickly eliminated when the company found the cost of the lease plus the additional core and maintenance would be greater than the cost of a 158. The 3031 was eliminated when it discovered "the delivery date was so far out that we couldn't do anything fast enough to make it very beneficial," Stubblefield explained.

The decision to buy the Itel system was clinched when its cost was found to be lower than that of a 370/158 Model 3 on a third-party lease. The decision to give Itel the nod was made even easier by the fact that the California company was willing to take over the lease on the Model 65.

Once Rand McNally decided to acquire the independent's unit, it began the software and planning to bring it in-house. Since the company had previously been running The Computer Software Co.'s Extended DOS (Edos) package on the Model 65, it had no experience or expertise with either VM or OS.

The user hired an experienced systems programmer and has sent some of its employees to school to learn the newer operating systems. In addition, Stubblefield, said, Itel assisted him by providing two software programmers.

The initial system generation efforts were

(Continued on Page 40)

# HIS Offers Growth Path From Large Xerox Sigmas

PHOENIX — Honeywell Information Systems, Inc. has announced a distributed processing system (DPS) designed to provide a growth path for users of the Xerox CP-V operating system. The HIS Level 66/DPS/C system is based on HIS Level 66 technology packaged for the CP-6 operating system, the company said.

The system is aimed at the high end of the CP-V user base — Sigma 9 and large Sigma 6 and Sigma 7 users, according to a spokesman.

HIS, which took over responsibility for the Xerox computer base in February 1976, announced two versions of the system: the Level 66-DPS/C3, configured for a maximum of 120 asynchronous communications lines, and the DPS/C5, for 200 lines.

Significant features of the systems include a cache memory on the CPU, virtual memory addressing and memory protection, system controller, MOS-based system memory and user storage and a Level 6-based front-end processor.

The prime hardware difference between the systems lies in the addition to the C5 of a second system controller and a second front-end processor, the spokesman explained.

Both systems — designed to operate exclusively with the CP-6 operating system offered by HIS — feature an associative memory that facilitates virtual memory mapping by holding the 64 most recently referenced page table words, he said. A virtual memory with 512 working spaces (one map for each user) permits each user's program to be fragmented in 1K word, he added.

Additional features of the two systems are binary, decimal and floating-point arithmetic; an instruction set of 54 business-oriented instructions and 197 opcodes capable of providing 350 operations; and a 2K-word, TTL bipolar 100 nsec memory featuring set associative first in/first out (Fifo) replacement algorithm for frequently accessed instructions and data, the spokesman continued.

### RMA Facilities

Reliability, maintainability and availability (RMA) facilities on the systems, according to HIS, include 48 double-word history registers that contain the most recent discrete events; a fault register indicating the nature of any malfunction; automatic processor instruction retry; and a floating fault vector that allows the monitoring of a selected condition by diagnostic software.

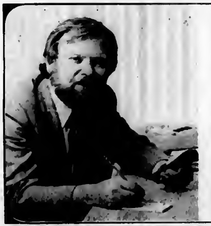
Also included in RMA facilities is the HIS Error Logging and Analysis (Elan) progam, which provides printouts of the error log.

Word size on the systems is four 9-bit bytes, with a memory cycle time of 750 nsec per double word, the firm stated. System memory is a maximum of 512K words of MOS technology; that amount will allow up to 280 simultaneous users, assuming an average user size of 25K bytes, the firm noted.

I/O features include an I/O multiplexer, which interfaces the peripheral controller and front-end processor to the system controller; capable of a maximum speed of 4M byte/sec, the ability to attach up to 16 subsystems to one I/O multiplexer; and a direct memory access (DMA) channel through the multiplexer.

In addition, microprogrammed controllers control the disk and tape drives, with dual-channel access available on both disks and

(Continued on Page 40)



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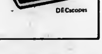

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## *Disk Pack Trends — Part 2*

# Technology Advances Bring Density Changes

**By Phillip R. Ricketts**
Special to CW

A wide head gap is preferred for writing and a narrow gap for reading the signal on the disk pack. The trade-off is in favor of reducing the gap if information density is to be increased; if it is not, the head may try to read two adjacent signals, resulting in interference.

As information density (bit/in.) increases, the size of the magnetic field representing each bit must decrease so the pulses do not crowd each other. Density can be increased up to a point without decreasing the coating of the platter; however, magnetic fields, like magnets, must have a certain minimal height-width relationship.

Therefore, there is a critical point at which the coating thickness must be reduced to keep the proper relationship for the magnetic domain.

As the size of the magnetic domain decreases, less of the signal (magnetic field) protrudes above the disk surface. To read the signal properly, the head must fly closer to the disk in order to pass through the protruding field.

This lessened head-to-surface distance is the key to the problem. Experimental studies have shown that the effect of the head height on density is much more pronounced than the thickness of the coating.

The second part of the problem of increasing information density is to increase the density of track/in. This is achieved by reducing the mechanical tolerances associated with positioning the head over (and within) the track. The head must be aligned within a fraction of a track width — typically, ±20%.

*Part 1 dealt with the fundamentals of recording and reading information on a disk pack and the kinds of media available. This week, in the final half of this series, Memorex Corp.'s Disk Pack Division product manager discusses factors affecting storage capacity.*

Other methods for increasing density (improving the coating materials, orienting oxide particles in a common direction and increasing the signal/-noise (S/N ratio) are beyond the scope of this discussion.

Two hardware developments, data modules and head-disk assemblies (HDA), provide advantages over older pack technology for increasing information density. The advantages result from fundamental differences between the two technologies.

The first difference is an environmental one. With closer tolerances (typically, just a few millionths of an inch for high-capacity disks), a clean environment is essential. For instance, a dust particle, generally .00150 in. in diameter, is 75 times larger than the head pack distance at .000019 in.; a human hair, at .003 in., is several orders of magnitude greater than this distance (see figure on Page A).

The combination of low head mass and a slim air cushion combine to make the effect of contaminants especially disruptive. A contaminant such as a hair can physically crash into the head, causing damage. A contaminant that will physically pass beneath the head will nevertheless disrupt the air cushion.

Since there is a mechanical response time required for the head to respond — because of the inertia of the head — the head may or may not fly over the contaminant, depending on slope of the irregularity. If the head pack distance becomes too great, the signal will not be read.

In addition, the head may oscillate and come into contact with the surface, causing physical damage to the surface as well as the head.

This problem can be abated in the manufacturing process by assembling these sealed elements in a "clean room," one in which the air is filtered and other special precautions taken. At Memorex, a Class 100 clean room — in which the air supply is regulated so there are 100 or fewer particles per cubic foot of air ranging from .5 microns to 5 microns — is used for assembly.

The second difference between the older and newer disk technologies is that the heads are sealed within the pack in the newer method. Heads, carriages and disks themselves all have tolerances varying around a mean value, and each element is likely to have a slightly different variance.

Combining these elements into one unit means the overall variance is reduced, allowing more precise head-to-track alignment.

The third major difference relates to the lessened mass of the head. Earlier technologies applied several hundred grams to the head; this required a mechanism to reach between the disk to apply and remove the load so the head would not crash when the drive was shut down and the air cushion removed.

The sealed technology employs significantly lighter heads to land on the disk during a start and stop operation; this eliminates the need for the head-loading mechanism.

The removal of this mechanism means there is one less element that can fail, thus improving reliability. In

(Continued on Page 39)

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# Technology Advances Bring Improvements in Density

*(Continued from Page 38)*

addition, with a lighter head load, two heads can now be mounted on a single arm, resulting in a head that now need move a shorter distance for a given recording zone; clearly, this decreases the time needed to access data.

The HDA provides a fourth major difference, which is an amplifier (integrated circuit) positioned close to the read/write heads. Thus, the signal has to travel a shorter distance before being amplified. The enhanced signal allows the head to fly higher than it would otherwise.

Aerodynamically caused difficulties relating to head height can also occur during the disk manufacturing process. Significant irregularities of the disk surface can cause some of the same problems as contaminants; to ensure a smooth surface, the manufacturer must polish the disk so the surface finish tolerance is less than .000002 in.

Furthermore, the coating of the disk must be of high quality, since defects in the coating are more easily detected at higher information densities. For instance, at $10^6$ bit/sq in., a bit occupies only .000001 in. of space.

The problems caused the user by head crashes — loss of the drive, loss of computer time in reconstructing the data on the damaged pack, potential irretrievable loss of data — are intensified with the data module and HDA technology, which offers the capability of storing a massive amount of data on a single pack. For example, the Memorex 3650 HDA can store 317.5 million bytes.

To help reduce performance problems, Memorex uses a vertically integrated manufacturing approach which we feel gives us better control over production. The reasons for this are three-fold: since our focus is on the total product, the quality of the product components is not reduced to save money.

Secondly, redundant inspections are eliminated; finally, since we are our own prime customer, we can react more quickly to material shortages or random order fluctuations.

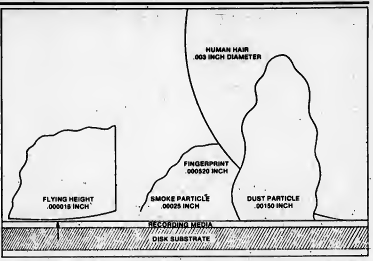
A manufacturer of only packs, which is selling them to other manufacturers, may be unwilling to make changes for one customer only, since it might be economically disadvantageous. However, vertical integration lessens the impact of these considerations, which we feel benefits our customers.

# Document Dispenser Offers Portability

LENEXA, Kan. — A portable document dispenser from Stephens Systems, Inc. is said to reduce the boredom of routine paper processing.

The Pacesetter displays forms or documents to an operator entering data at a terminal or keypunch at a preselected throughput rate. The tabletop, 16-lb unit requires no adjustment to handle envelopes, punch cards, paper forms or tissue copies.

Stephens is at 8445 Quivera Road, Lenexa, Kan. 66215.



Various Types of Contamination in Relation to Data Mark Head Flying Height

# DP Environment Controlled By Elmet Corp. Systems

SANTA FE SPRINGS, Calif. — Elmet Corp. has designed a series of environmental control systems for computer rooms that are available in 6-, 8-, 10-, 12-, 19- and 25-ton capacities.

The Data-Aire Mark-VII line is said to provide cooling, dehumidifying, humidifying, reheating and dust control of computer room air and to reduce energy usage by as much as 90% under certain conditions.

The devices, which use a glycol solution as the cooling medium, provide temperature control to within ±2° and relative humidity to within ±58%, a spokesman said.

The systems are available with hot gas reheat as well as an evaporative pad humidifier featuring hot gas water heater.

They operate with one to four compressors, the spokesman added.

Prices begin at $3,600 for the 6-ton unit and at $9,000 for the 25-ton unit, Elmet said from 8110 Sorenson Ave., Santa Fe Springs, Calif. 90670.

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In our August 28th Special Report, we'll be taking a closer look at the profits (and pitfalls) of mini-using. Featuring a series of applications and tutorial stories, this supplement will examine how others have solved their mini problems, and will include tips from vendors. It will cover topics like:

- *Use of small computers in large system hierarchies*
- *Minicomputers as software development tools*
- *How to select a printer for mini systems*
- *Future developments in disk systems design*
- *Maintenance of magnetic storage media*

If you're interested in new ways to increase efficiency and cut costs in your business operations, don't miss this *Computerworld* Special Report. And if you are a manufacturer or dealer in minicomputer equipment, your ad should be there. Closing date is August 11th. Call your *Computerworld* salesman for more information and complete assistance in ad planning. Or, to place an ad, call Terry Williams at (617) 965-5800.

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## *Xerox Users Pleased*

Xerox mainframe users have reacted favorably to the announcement of a system by Honeywell Information Systems, Inc. designed to run the Xerox CP-V operating system.

John Eschinger, assistant director of the computer center at Bucknell University in Lewisburg, Pa., and chairman of Exchange, the Xerox users group, said, "Exchange worked hard with HIS to come up with a plan to put out CP-6, the functional equivalent of the Xerox CP-V. We're pretty excited about it — it's probably the high spot of HIS' support of our user base."

Charles Fries, systems programmer with Motorola, Inc., in Chicago, said he was impressed with the announcement. "We're a fairly large user, running a multiprocessor Sigma 9 with two CPUs. From what I can tell, there won't be much increase in throughput on the first several passes, at least not for the single user.

"However, I was enthusiastic over the demonstration [at a recent users group conference]. Most of the people at the demo were very happy with what they saw," he recalled.

Eschinger estimated there are about 150 Xerox time-sharing users throughout the country, with about 40 of these being academic users.

"Just about everyone who saw the demonstration was pretty impressed. HIS demonstrated the file management abilities of the system and some of the utilities running on an HIS Level 66/60 system with the CP-6 operating system," he said.

Commenting on the relatively long time between the system's announcement and its availability, Fries said Xerox users were "getting itchy."

# HIS Offers Growth Options To Users of Xerox Sigmas

*(Continued from Page 37)*

tapes.

Software for the systems, which were initially announced before the Xerox user group conference that met in Toronto in late May, was designed to be a look-alike for the Xerox CP-V operating system. It includes a variety of reentrant language processors including Cobol 74, ANS Fortran, APL, Text and Basic.

HIS is planning to provide a comprehensive set of migration tools including data, file and language transition aids, it said.

The price of a typical Level 66/DPS/C3 system with a CPU, associated storage, front-end processor, 1.5 billion bytes of disk storage, card reader/punch and two line printers will be approximately $1.8 million.

A Model C5 with CPU, storage, three front-end processors, 2 billion characters of disk storage and printers, tape drives and card reader/punches is priced in the neighborhood of $2.4 million, the spokesman said from 200 Smith St., Waltham, Mass.02154. First deliveries are expected to begin in the fourth quarter.

# Independent Route Best For Upgrade, User Finds

*(Continued from Page 37)*

done at Itel's Palo Alto, Calif., data center. "We did some out there, came back here, laid 'em down and we were running," the manager said in describing how smoothly that operation went.

Very little benchmarking or acceptance testing was done in the course of the conversion, he added. "We knew the speed of the 158. "We had taken some of the programs from the Model 65 and run benchmarks on them at Palo Alto, so we knew what type of improved productivity we were going to get. We had also visited several other Itel sites to talk with their managers about what they had found out about it," he said.

The same confidence was reflected in the installation of the AS/5. Itel started setting up the system on a Wednesday and had powered up the hardware and run diagnostics by the next day.

"When we finished our production load on Saturday, we began removing the Model 65, and it was about noon on Sunday that we turned it over for production," Stubblefield remembered. No formal acceptance testing was conducted.

At this point, Stubblefield is satisfied with every aspect of the service he is getting from Itel. "All the Itel people seem to take the attitude that 'the customer's problems are our problems' — it's really been a very satisfactory arrangement, from the top people on the coast all the way down through the people in the field," he remarked.

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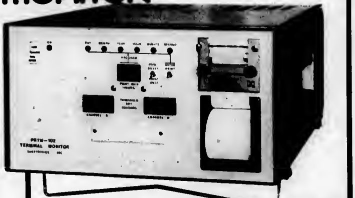

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Series/1 has also increased its online file capacity almost five-fold with its new 4963 Disk Subsystem with up to 256 megabytes of online storage per unit in 64 megabyte increments.

To provide either low-cost online access or back-up storage capability, Series/1 offers the new 4966 Diskette Magazine unit.

And Series/1 now features a 370 channel attachment device that provides channel-to-channel communication between Series/1 and System/370, including the 3031, 3032 and 3033.

In all, Series/1's extensive hardware menu includes 9 rack-mountable processors, matrix and line printers, standard and customized display stations and a wide variety of I/O devices.

## New software

The broad range of Series/1 hardware is supported by a comprehensive set of software. In addition to Fortran IV, PL/I and Assembler, Series/1 now provides COBOL, one of the most widely used commercial application languages.

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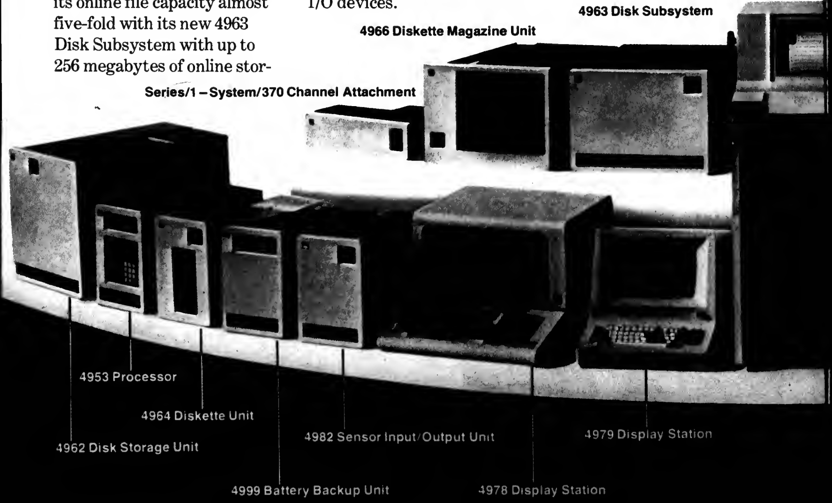

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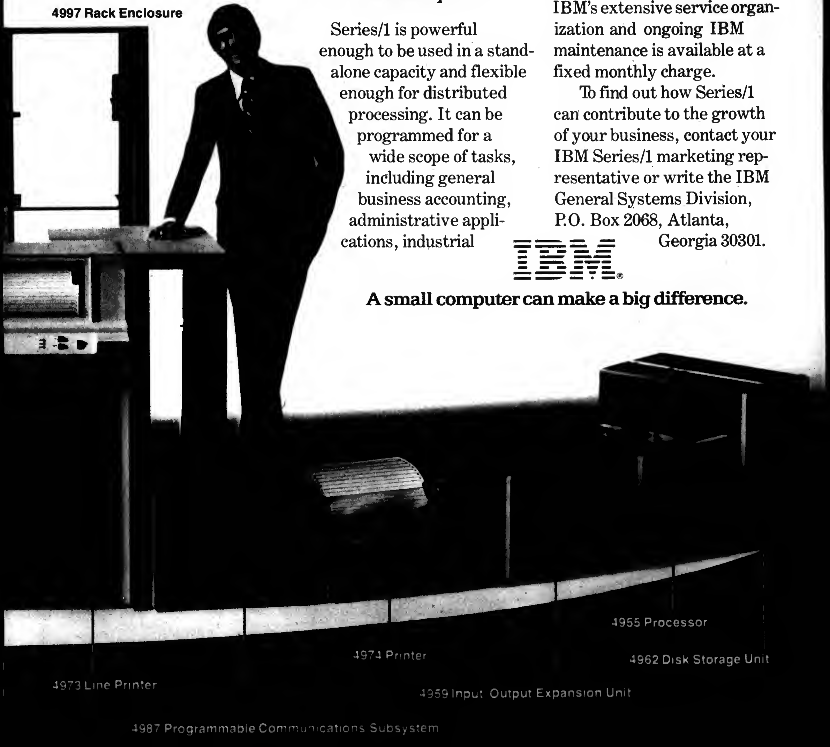

## Second Printer May Not Be Needed

# Print Cycle Analysis Can Cut Print Time, Costs

Special to CW

Printer-bound?

Before you rush out and get a faster printer or a second printer — or even computer output microfilm — how about giving print cycle analysis an opportunity to free up a substantial portion of your printer and/or computer time?

"Statistics show only 62% of computer time is used wisely," Donald E. Strobeck of NCR Corp.'s Systemedia Division told the NCR Users Computer Conference in New Orleans recently. "But print cycle analysis, the study of the time required for printing and for vertical movement of the computer form, shows us how to take advantage of individual printer capability.

"This, plus intelligent forms design, can reduce total run-time on a particular form or system, freeing valuable computer time.

"Print cycle analysis is a tool that can and should be used by programmers and forms designers alike," he continued. "The principles of efficient high-speed writing should be considered any time new forms are needed, especially during programming.

"And the forms design specialist should be aware of design principles to follow when creating all types of forms for any writing methods."

### Fractions Add Up

By way of illustration, Strobeck redesigned a typical earnings statement, reducing the print lines from seven to three and cutting the printer movement between print lines. This not only reduced printer time by 44%, it also cut the cost of the form itself because continuous forms costs are directly related to the length of the document, he explained.

Also reduced were the times required for bursting, signing and decollating.

"Normally, the first reaction to savings in computer printing time is that it would be inconsequential because of the high speed of operation," Strobeck said. "However, if we save only a fraction of a second on each document printed and this is multiplied by thousands and hundreds of thousands of documents, the annual savings in machine time will be substantial."

### Suggested Changes

The changes Strobeck recommended for printing efficiency included:

- Eliminating space between print lines.
- Rearranging and/or combining print lines to get more data on each line.
- Rearranging space.
- Printing two documents at one time, side-by-side — "two-up."
- Adding data to existing records.

"On most high-speed printers, the time required to print one character on a horizontal line is the same as for printing the maximum number of characters on that line," Strobeck explained. "Thus, basic to design improvement is increasing the number of characters per line and decreasing the number of printed lines."

In redesigning the hypothetical earnings statement, Strobeck used a print cycle timing chart and determined the time required for each step in printing this form — each incidence of printing time and vertical movement. The original form — 13-5/8 in. by 3-1/2 in., with the seven print lines — required 342.2 msec.

The redesigned form — now a standard 14-7/8 in. by 3-1/2 in. with the number of print lines reduced from seven to three — required only 189.4 msec.

### Time, Cost Savings

Assuming a run of 300,000 forms and a machine cost of $70/hour, the original form would have required 28.52 hours to run at a cost of $1,996.40. The redesigned form would run in just 15.78 hours and machine costs would be $1,104.60.

That's a savings in printer time of 12.74 hours and a machine cost saving of $891.90, or the 44% Strobeck mentioned.

A user printing 300,000 copies of something is likely to be at the higher end of the computer size range. However, at the lower end of the range, users of systems such as NCR's 8100 series, which is totally dedicated to the printing operation when it occurs, can also perform print cycle analysis and achieve greater print efficiency. Thus, the technique has something to offer most computer users, large or small, Strobeck explained.

"The design techniques employed in print time reduction generally require simple program changes, and a program change is a one-time cost," Strobeck declared. "But printer time is a continuing yearly cost.

"As a company grows and changes, so does the volume of forms and computer systems. The extra time may not be required immediately, but the future must be considered," he pointed out.

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## For Manufacturers, Distributors

# Systems Expand Sans Reprogramming

**By Jeffry Beeler**
CW Staff

FAIRFIELD, N.J. — Without requiring any programming changes, a family of small business systems from Digital Computer Controls, Inc. (DCC) can reportedly expand from IBM 5110 to upper end System/3 performance levels.

Intended for manufacturers and wholesale distributors, the Synergist family consists of five systems that provide both upward and downward software compatibility, according to a DCC spokesman.

"A lot of vendors claim to offer systems compatibility, but ours isn't contrived," the official said. "Users can physically take their disk packs with operating systems and application software and move them up and down from one of our systems to any other."

The five members of the Synergist line form three systems series: the 1500, 2500 and 3700. At the low end, the 1500 series consists of two models: the 1500, comparable in performance to the IBM 5110; and the 1550, comparable in performance to the IBM System/32.

In the middle range, the 2500 series also consists of two models: the 2500, which compares roughly to the System/34; and the 2550, which compares to the Series/1.

At the high end of the Synergist family is the Model 3700, which reportedly provides performance comparable to that of the System/3 models 12 and 15.

The two members of the 1500 series differ from each other primarily in main memory capacity and mass storage type, the DCC spokesman explained. Whereas the Model 1500 stores 48K bytes expandable to 64K bytes and incorporates floppy disk units, the 1550 holds 64K bytes only and incorporates cartridge disk systems.

The two 2500 series systems differ in printer speeds as well as in main memory capacity. The Model 2500 stores 64K bytes expandable to 128K bytes and provides a 180 char./sec printer; the 2550 holds 128K bytes only and uses a 125 line/min printer.

### Advantages Over Rivals

What advantages do the Synergist systems provide over their respective IBM rivals? Although software compatibility ranks high on the list of competitive edges, the DCC official also cited application software as one of the systems' chief strong points.

"The application software used by the Synergist family has been on the market a couple of years," he said. "It has been tested at several locations and is maintained by Digital Computer Controls itself rather than by its local distributors."

In addition to using the same operating system and application software, the three Synergist series share much of the same hardware, and the two largest series are fully hardware-compatible, the official added.

Able to accommodate up to two concurrent users, the 1500 series systems incorporate a 16-bit

(Continued on Page 48)

# Two Tape Systems Operate With BC/7

BLUE BELL, Pa. — Users of the Univac BC/7 can reportedly make their small business systems tape-compatible with many large-scale configurations with two tape systems from the hardware manufacturer.

The Uniservo 10 systems come in a 9-track, phase-encoded version that operates at 1,600 bit/sec and an NRZI version that operates at 800 bit/sec.

Equipped with automatic tape threading plus automatic tape cartridge loading and unloading, the systems are said to suit applications like volume printing, data communications,, system backup, library storage and data archives management.

The phase-encoded version costs $12,145 or rents for $251/mo under a five-year contract; the NRZI version costs $13,425 or $277/mo. All rental prices include maintenance.

Univac can be contacted at Box 500, Blue Bell, Pa. 19422.

# Radio Station's Control System Smooths Preparation of Programs

LOS ANGELES — Programming flexibility has increased noticeably at KNX-FM Radio since the CBS affiliate automated its broadcasting operations with a minicomputer-based program control system.

Compared with KNX's previous attempts at automation, the current system lets directors more easily mix music, commercials and other prerecorded events to form continuous programming, according to Ric Hammond, CBS Radio's director of technical operations here. At the same time, the system has also allowed the station to preserve the "mellow sound" it has cultivated for years in its music format.

Built around a 20K-word Digital Equipment Corp. PDP-8/E, the system incorporates two Diablo Systems, Inc. hard disk units with enough storage capacity to catalog titles for up to 10,000 music selections, advertisements, announcements and other material, all of which are taped on audio recording cartridges.

A director begins planning a day's programming one week ahead by using a CRT terminal in his office to summon the approximately 3,000 music titles currently cataloged by the system. If he wants to set a certain mood or pace, he requests a display of all the computerized listings of a specific vocalist and further sorts the titles according to tempo or other characteristics.

Identifying each title by its catalog number, the director then enters his selections into the CPU through the CRT terminal. At the same time, he intersperses his musical entries with the catalog numbers of commercials and other nonmusical program items.

When he has selected all the

(Continued on Page 46)

At KNX-FM Radio in Los Angeles, a program director uses a PDP-8/E-based system to schedule the playing of prerecorded music, commercials and announcements.

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COMPUTERWORLD
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## Printer Runs Quietly

SUNNYVALE, Calif. — Hospitals, libraries and other environments requiring quiet are expected to be among the prime user sites of a Silonics, Inc. printer that emits 48 db at one meter, according to its developer.

Designed for minicomputer and microcomputer system OEMs, the Quietype unit produces upper/lower case plus bold-face and elongated characters with a "drop-on-demand" printing technique that uses a pressurized, disposable cartridge.

In response to pulses from a piezoelectric transducer, the unit squirts ink from seven tube-like delivery channels to form 96 Ascii characters in a 7-by-9 dot matrix.

Using this technique, the nonimpact, jet-ink printer outputs 180 char./sec in the standard 80 char./line format.and up to 210 char./sec in the 132 char./line format, Silonics said. At 27 lbs, the bidirectional desktop printer speeds throughput with a motion-minimizing algorithm.

Quietype costs $2,495 with OEM discounts available from 525 Oakmead Parkway, Sunnyvale, Calif. 94086.

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# Floppy Disk System for OEMs Offers Storage Up to 1.2M Bytes

CHATSWORTH, Calif. — A floppy disk system from Pertec Computer Corp. (PCC) reportedly provides OEMs and development laboratories with two times more storage capacity than traditional single-density disk systems.

The double-density Icom FD3812 stores up to 1.2M bytes in either the IBM 3740 single-density format or the IBM Diskette 2D dual-density format, both of which are soft-sectored, according to PCC spokesmen.

With 256 byte/sector as a standard feature and 1K byte/sector as an option, the disk system is said to rotate at 360 rev/min, access in 10 msec track-to-track, provide 40 msec head load and average 83 msec latency.

Key features available with the FD3812 include built-in formatter and controller, read/write buffers that allow asynchronous data transfer, optional direct memory access (DMA) data transfer and diskette write protection.

In addition, the system's controller operates up to four drives with no software or hardware modifications. Responding to eight-bit command words, the controller initiates DMA data transfer, sends data from the read buffer to the write buffer or transfers data to and from the diskette.

Measuring 7.25 in. high by 19.2 in. wide by 21.75 in. deep, the FD3812 provides a 50-pin flat-ribbon cable with 3M interface connector and requires 110/125 Vac, 60 Hz, 200 W.

The unit costs $2,300 in 100-unit quantities and is available from PCC's Microsystems Division at 20630 Nordhoff St., Chatsworth, Calif. 91311.

## Gamma Camera System Half the Weight of Others

MARLBORO, Mass. — Medical personnel can reportedly gather cardionuclear data almost anywhere in a hospital with a Digital Equipment Corp. (DEC) system that collects data from gamma cameras.

Less than half the weight of comparable gamma camera systems, the MDA-11 can easily be transported by one person, DEC officials claimed.

Capable of connecting to as many as four mobile or stationary gamma cameras, the system can gather data for either static or dynamic studies and have it processed off-line by a nonportable Gamma-11 system.

A typical MDA-11 incorporates a PDP-11/03, VT100 terminal, diskette drive unit, camera input interface and Gamma-11 software.

The system costs $23,800 and will become available this fall from DEC at 146 Main St., Maynard, Mass. 01754.

## Radio Program Preparation Eased by Control System

*(Continued from Page 45)*

items for a day's broadcast, a Centronics Data Computer Corp. printer generates a program listing that helps KNX engineers insert the correct cartridges in the correct trays in the station's six playback machines.

One week later the playback machines, acting under computer control, continuously play the cartridges in a prearranged sequence. In this way, the resulting programs proceed smoothly from one selection to the next and create the illusion of live broadcasts despite their prerecorded contents.

During a typical 24-hour broadcast, the station seldom plays more than 1,000 musical and nonmusical titles — less than half the system's total disk capacity of 2,400 titles per day.

### Jamming Snafus

Before it installed its current system, KNX controlled its programming with a semiautomated system consisting primarily of two music-playing, reel-to-reel tape machines and a mechanical carousel that held cartridges for commercials. Although the system automatically switched back and forth between music and commercials, the station still had to assign a technician to change tape reels each hour and to periodically replace cartridges.

After five years on the job, the semiautomated program control system gave way in 1972 to a card reader that allowed the station to begin planning programs one day in advance.

Under this system, technicians punched a card for each item on the station's daily programming schedule. When the tape decks had finished playing one cartridge, a card passed through the reader and caused the players to switch automatically to the next cartridge on the agenda.

"Although the system was supposed to allow us to run in an unattended mode overnight, the cards frequently jammed, and the scheduled switching would not take place," Hammond recalled. "When this occurred, a technican from the AM station downstairs would have to go up and correct the problem to keep us on air.

"However, since his work on the AM side took precedence, it would sometimes be half an hour or so before he could be on the scene."

Moreover, the system each day forced the station's traffic department, which schedules air time for commercials, to remove cards for advertisements that were not slated to run that day and insert cards for commercials that were scheduled.

"We never knew if the cards were put in the right spot until the program switched from one item to the next, and then it was too late to correct any mistakes," Hammond recalled.

Shifting his attention from the past to the future, the technical operations director predicted KNX will soon finish programming the PDP-8/E to communicate with a companion Cincinnati Milacron, Inc. minicomputer.

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## *System Controls Inventory*

# Insurance Company Says It Believes in Magic

NEW YORK — An inventory control system known as Magic has lived up to its name at the Equitable Life Assurance Society.

In its first 10 months of operation, the minicomputer-based system has made 30% — $2 million worth — of Equitable's $7 million supplies inventory disappear, almost as if by sleight of hand.

Company officials also credit the interactive system, whose full name is Management and General Inventory Control, with monitoring the status of 6,000 stock items and with speeding supplies requisitions for more than 400 of Equitable's branch offices.

Among its other feats, Magic has helped simplify inventory picking, packing and shipping by allowing the insurance firm here to store all its like stock in the same place for the first time, according to John J. Hill, Equitable's supplies director.

Before it acquired Magic, Equitable controlled its supplies inventory with a system built 15 years ago around an IBM 705 and subsequently converted to an IBM 7080, then a 360 and 370.

"The old system was good for its day, but it could not solve the growing problems we faced in deteriorating service and distortions to the actual inventory condition," John J. Reilly, the company's assistant vice-president, recalled. "After orders were filled, the requisitions were forwarded for keypunching into a weekly computer run on inventory status. By the time reports were received in the supplies area, the data could be two weeks old.

"Also, there was poor error correction, little identification of obsolete items and no facility for back orders."

### 'Thorough Housecleaning'

In late 1976, Equitable conducted a feasibility study to find an alternative approach to supplies inventory management. "Our primary objective was to create within a year a system that would solve past problems and meet future needs," Hill explained. "A minicomputer system appeared to be the most efficient way to obtain these capabilities and at the same time provide a catalyst for a thorough housecleaning of obsolete inventory."

After evaluating various minicomputer service firms, Equitable engaged Index Systems, Inc. of Cambridge, Mass., to develop software for a customized inventory control system. Index had previously designed a minicomputer system for the insurance company's investment department.

Working closely with Equitable administrative services and corporate systems departments, Index produced the Digital Equipment Corp. PDP-11/34-based Magic system, which became operational last October.

With the system, Equitable's branch offices need only one requisition form to order forms, paper and general supplies from a master catalog. Previously they required up to 20 forms, company officials recalled.

As soon as requisitions arrive at company headquarters here, clerks enter the orders into Magic through CRT terminals. In this way, the system tracks on-hand quantities of each of the firm's supply items and monitors back order levels. It also stores inventory prices and notes primary as well as secondary stock locations.

"All orders must go into the system before they are picked, packed and shipped," Reilly stressed. "Any items not available are automatically back ordered, and users can be told the status of every item they order."

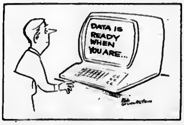
Five terminal operators oversee all the firm's supply requisitions, which Equitable estimates will total about 70,000 during the coming year. In addition to entering, changing and deleting information about outgoing shipments, each operator can record incoming supplies and immediately update inventory levels for the appropriate stock items.

### History of Use

Magic also produces assorted reports like pull sheets or pick lists, updated readings on all inventory conditions and a supplies catalog listing all available items.

Among its other functions, the system maintains a history of each item's usage so Equitable can time its supplies purchases to coincide with periods of peak demand. Under the previous system, the company guarded against inventory shortages by maintaining a six-month supply of each stock item.

Later this year, Equitable plans to extend Magic's on-line control capabilities to its purchasing operations. The result promises to be a system that automatically alerts supply managers to low-stock items, generates and tracks purchase orders and maintains current data about vendors, company officials said.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## LSI-11 Gets Mini's Power

CRANBURY, N.J. — A bulk core system from Dataram Corp. is said to combine a Digital Equipment Corp. (DEC) LSI-11 microcomputer with the power of a minicomputer.

Model BCM-1 "offers access time thousands of times faster than fixed-head disk systems" according to a Dataram spokesman.

The unit is transparent to the LSI-11 and provides a bulk core controller that emulates a fixed-head disk system, he added.

A 1M-byte BCM-1 with an LSI-11 and a 32K by 16 semiconductor main memory costs $3,200, compared with $14,600 for a 512K-byte version with the same microcomputer and memory capacity.

Dataram Model BCM-1

Dataram is located at Princeton-Hightstown Road, Cranbury, N.J. 08512.

## Security Features Highlight Multiuser Business System

LOMITA, Calif. — A system of locks and keys that reportedly prevent unauthorized access to or modification of data files highlights a small business system from Microstar, Inc.

Microstar I incorporates a CPU built around a Zilog, Inc. Z-80 microprocessor, 64K-byte random-access memory, keyboard console, 1,920-character CRT terminal and floppy disk system expandable from 600K to 1.2M bytes.

The multiuser system also accommodates Basic and Pidgin, a file access language, plus a set of utility programs. Applications programs available with the system perform accounts payable, accounts receivable, payroll, general ledger and order entry.

Microstar I

In addition, the system comes with a selection of printers operating at speeds up to 300 line/min.

Microstar I costs $12,500; leases are available. The vendor is at 25601 Narbonne Ave., Lomita, Calif. 90717.

## Printer Users Get 3/15D Link

HORSHAM, Pa. — Decision Data Computer Corp. users can now reportedly attach two printers from that company's 6600 series to an IBM System/3 Model 15D and operate them simultaneously.

This ability to assign a printer to each of two programs running concurrently boosts throughput to as much as 3,000 line/min and ensures one printer is always available when the other is out of service, according to a Decision Data spokesman.

Users can add any one of the six models comprising the 6600 series to a 3/15D already equipped with an IBM 1403, or they can use any two members of the Decision Data line to replace a 1403, the official explained.

Monthly rental and maintenance prices for the Decision Data printers range from $290 to $1,675. Purchase prices range from $8,000 to $41,175. Decision Data is located at 100 Witmer Road, Horsham, Pa. 19044.

## DCC Line Runs IBM Programs

(Continued from Page 45)

Data General Corp. Micronova with a DG Dasher LP2 printer and up to four 315K-byte floppy disk or cartridge disk systems.

The 2500 series systems, by contrast, support any combination of up to nine CRT terminals and printers and incorporate a DG Nova 3 with up to four 10M-byte disk systems.

The Model 3700 also uses a Nova 3 CPU, but accommodates up to 17 concurrent users and stores 128K bytes expandable to 256K bytes. It also supports a 10M-byte disk system with a capacity for as many as 760M bytes of on-line mass storage.

Because DCC's distributors market and set prices for the firm's products, the cost of the Synergist systems varies somewhat from locale to locale, the spokesman noted. In general, however, prices for the five systems range from $15,000 to $75,000.

All models are available immediately from DCC at 12 Industrial Ave., Fairfield, N.J. 07006.

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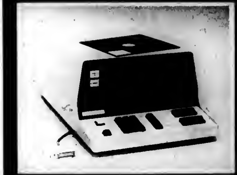

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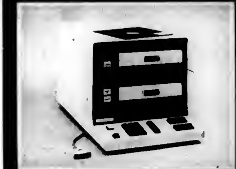

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### Not 'Home' Users

# Micros Going to Hobbyists, Businesses

PALO ALTO, Calif. — About 8,000 personal computing units per month were shipped in 1977 by the various suppliers in the business, down from the 10,000 originally forecast by Vantage Research, Inc.

But who's buying them? According to *Personal Computing Industry Report,* (PCIR), a new monthly newsletter published here, very few of these computers are actually going into homes as consumer products. Most are being bought by hobbyists, computer game enthusiasts and/or businessmen who are using the systems as a low-cost way to learn about computers.

PCIR also indicated that sales to primary and secondary schools as well as colleges are also growing. This was attributed to their low cost and use of Basic as the resident high-level language.

Most suppliers, according to PCIR editor Bob Wickam, are trying to broaden the appeal of their products by offering business-oriented configurations — that is, floppy-disk, rather than cassette-based, systems.

Specifically, the Radio Shack TRS-80 with a printer, 32K of memory and dual floppy disks costs $4,000, competing directly with business systems offered by Pertec Computer Corp., Imsai Manufacturing Corp. and Polymorphic Systems, Inc. for example, who are sliding from the small business market into microcomputing.

### Coming Trend

A trend is brewing among home computer users toward shifting dedicated applications such as security and environmental control, for example, from the owner's $1,000 system to various types of microcomputer-based dedicated controllers in the $300 range. This is an "attractive alternative to tying up a $1,000 general-purpose system for watering the lawn and running the burglar alarm system," PCIR said.

PCIR's annual subscription rate is $195. For more information, write Vantage Research, Suite 110, 2680 E. Bayshore Road, Mountain View, Calif. 94043.

## AMI Including Basic With Development Unit

SANTA CLARA, Calif. — American Microsystems, Inc. (AMI) is now including Basic with shipments of its Microcomputer Development Center (MDC).

The language addition allows the MDC to be used as a general computer system as well as a microprocessor software developmental tool, the firm said.

AMI's version of Basic contains all the standard Basic commands, statements, functions, mathematical and relational operators and adds the commands needed to handle files in the MDC's dual floppy disk system.

Cost of the system with all options is $9,600 from MDC Marketing, American Microsystems, Inc., 3800 Homestead Road, Santa Clara, Calif. 95051.

## Service Copies TRS-80, Pet Cassette Programs

SUNNYVALE, Calif. — Microsette Co. is now offering cassette program duplication services for Radio Shack's TRS-80 and the Commodore Pet in any volume from 100 to 100,000, the firm said.

Each cassette has a 60-day warranty. Prices start at $1 each from Microsette Co., 777 Palomar Ave., Sunnyvale, Calif. 94086.

# Z80-Based System Incorporates Two Quad-Density Floppies

WESTLAKE VILLAGE, Calif. — A microcomputer featuring two Micropolis quad-density floppy disks and a Z80 CPU is being offered to hobbyists and small business users by Vector Graphic, Inc.

The general-purpose, byte-oriented Vector MZ is based on the industry standard S-100 bus, according to the company. Its CPU includes 158 basic machine language instructions and a minimum instruction cycle of 2 microsec. An 18-slot motherboard provides expansion capabilities of up to 64K of directly accessible memory using a parallel 8-bit word/16-bit address, the firm said.

The floppy disk drives are mounted directly on the front panel and have a storage capacity of 315K bytes each, formatted.

The unit is compatible with existing Vector I/O and memory boards. The basic system also includes an 18-slot motherboard, the Z80 CPU with 4 MHz clock, a disk controller board, a bit streamer I/O board with one serial and two parallel ports, 32K static random-access memory (RAM), 12K 2708 programmable read-only memory (Prom)/RAM board with extended monitor and Vector's Basic.

The system costs $3,750 from Vector Graphic, Inc., 790 Hampshire Road, Westlake Village, Calif. 91361.

## *Software Supports 6500*

AMES, Iowa — Computer Applications Corp. (Compas) is offering two software packages for the 6500 microprocessor family made by Rockwell International, Synertek, Inc. and MOS Technology.

The E/65, a text editor, and the A/65, a two-pass assembler, are similar to software written by Compas staff and offered for the Rockwell System 65, according to the firm. Each program was designed with transfer vectors to link the program to I/O routines in the user's system.

The E/65 software designed to edit assembler source code, utilizes line-oriented commands to specify text I/O and find specific lines to be edited.

E/65 uses string-oriented commands which allow the user to search for and optionally change a text string and character-oriented commands which allow cursor positioning and character deletion.

A/65 is a full two-pass assembler conforming to the specifications detailed in the Rockwell and MOS Technology cross-assembler manuals. Run-time options are provided to control listing formats, printing of generated code for Ascii strings and generation of object code, the firm said.

E/65 and A/65 cost $100 each and are supplied in object form on paper tape or KIM-compatible audio tape from Compas, P.O. Box 687, 413 Kellogg, Ames, Iowa, 50010.

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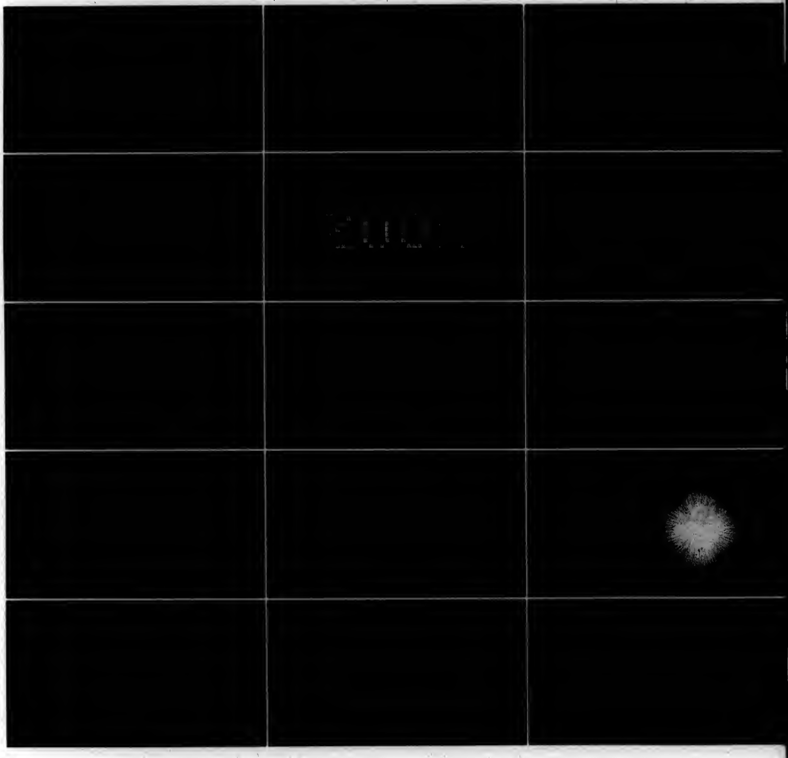

# graphics software.

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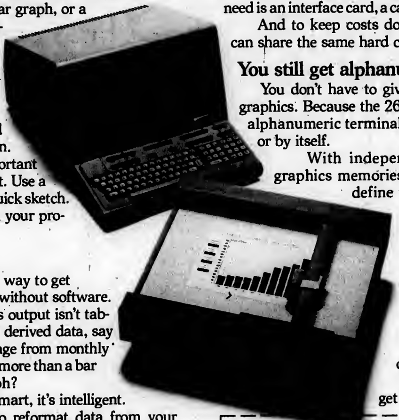

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The 2647A's the smart way to get graphics from tabular data without software.

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*National Commission Told:*

# Judges Can Expedite Antitrust Trials

**By Edith Holmes**
CW Washington Bureau

WASHINGTON, D.C. — The tough-minded, thorough judge who rides roughshod on attorneys, sets an early trial date and polices pretrial exchanges of documents and witness lists provides the best means of moving a big, complicated antitrust case through the judicial system, judges and lawyers told the newly formed antitrust commission here last week.

Appearing before the National Commission for the Review of Antitrust Laws and Procedures during its first meeting on antitrust cases the size of the U.S. government suits against IBM and AT&T, all of these witnesses disagreed with the concept of a blue-ribbon panel of judges who would only be assigned to try antitrust cases.

The lawyers said they would like to present an antitrust case to a judge who has presided over a similar trial. But all of the attorneys expressed a fear of an elite group of judges who might develop preconceived notions about cases affecting the economic life of the nation after hearing so many of them.

Chaired by the Justice Department's Assistant Attorney General John Shenefield, the 22-person commission is charged with the task of determining the scope of the problems that massive antitrust cases present. The commission must also decide whether to recommend changes in the procedures used in federal courts or to suggest alterations in the content of the antitrust laws.

### Problem 'Not That Big'

"Overall, the problem of the big case isn't that big," according to Ira Millstein, well-known attorney and chairman of the American Bar Association (ABA) antitrust section and its ad hoc task force to assist the commission.

Statistics from the Administrative Office of the U.S. Courts indicate that antitrust cases constitute only 1% of all the cases filed each year in the district courts. Last year, only 10 of the 1,700 civil and criminal antitrust cases filed in the federal courts lasted more than 20 days. Of those, the government's case against IBM held the record with 299 trial days at 1977's end.

While they are few, the biggest antitrust cases do cause problems, however. They tie up a judge and, in some cases, a jury for months and sometimes years. It is difficult for any one judge or group of jurors to absorb all the material presented in such a suit after a year of trial time, witnesses agreed.

In addition, as federal judge Alvin B. Rubin put it: "The right to a fair trial does not mean a right to a blank check on the public's account" in cases where the government brings an antitrust suit.

Millstein and Harold E. Kohn, senior partner in his Philadelphia law firm, contended that the problems are chiefly procedural and the solutions to them will be found in the courts.

"I personally believe that much of what's wrong turns on management by counsel and the courts," Millstein said.

### Firm Trial Dates

An ABA task force panel of attorneys suggested that by setting an early, firm and immovable trial date, a judge can solve many of the problems of the big case from its outset. A certain trial date limits the time the parties involved in the suit can exchange witness lists and documents — a practice called discovery. The opposing lawyers also are forced to define the issues in the case with greater precision, the panel members stated.

(Continued on Page 54)

*Reaction to ACS Petition*

# Bell DP Moves 'Aggressive': CCIA

**By Marcia Blumenthal**
CW Staff

ARLINGTON, Va. — AT&T's Advanced Communications Service (ACS) petition now before the Federal Communications Commission (FCC) [CW, July 17] is viewed as another example of the monolith's aggressive move into the DP industry.

"The combination of its Dataspeed 40 terminal, ACS and the fact it is licensing AT&T software products, in violation of the 1956 Department of Justice consent decree, all combine to say it is moving very aggressively into end-to-end data services," A.G.W. "Jack" Biddle, president of the Computer and Communications Industry Association (CCIA), said here.

It is difficult to see exactly what AT&T is trying to do, Biddle said, but after reviewing the petition, he said his organization was disturbed about the ability of the user to store programs and data in the system.

Reading between the lines of the petition, Biddle contended it doesn't take much imagination to see that the user will be processing data on an AT&T system with a program and files stored in that system.

AT&T's anticipated response that it is merely providing a capability for processing, with the user manipulating the data, doesn't hold water, Biddle declared, because AT&T is supplying the equipment for that processing.

Originally after the first Computer Inquiry, AT&T was prohibited from supplying DP services — storing, sorting, responding to programmed instruction and manipulation data.

AT&T's argument, according to Biddle, is that communications involves moving information without changing the semantic content, and carriers are not engaging in DP if they don't change the semantic content.

### Impact on Services Sector

Regardless of all arguments, Biddle claimed that AT&T's ACS would be competing directly with the time-sharing networks.

Agreeing with Biddle's assessment that ACS will greatly affect the service bureaus, J.L. Dreyer noted, "A communications tool that is good for in-house installations, reducing costs and giving more accessibility, will have a negative impact on the service sector of the industry."

Dreyer, executive vice-president of the Association of Data Processing Service Organizations, Inc., said his group will meet with AT&T early next month to discuss ACS.

Another major criticism of ACS, according to CCIA, is that initially the service would only provide network capability to satisfy the needs of the largest installed base of host computers and terminals.

Biddle interpreted this as meaning that only IBM, IBM-compatible, Teletype Corp. and IBM-compatible Teletype equipment would be able to operate over the network.

This situation potentially leaves Burroughs Corp. and Honeywell Information Systems, Inc. users out in the cold, Biddle noted, adding that it also poses a serious threat to other mainframers. ACS is a clear threat to modem

(Continued on Page 54)

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# Judges Seen Key to Speeding Antitrust Trials

(Continued from Page 53)

Other recommendations included filling the vacancies that currently exist on the federal bench at the district court level and hiring more judges. Judges need more education on how to manage large cases, the ABA panel said.

The judiciary could profit, as well, from the creation of incentives to expedite a lengthy trial, Rubin stated. An efficient judge receives no benefits for his efforts, he said, adding that the conduct of most judges is largely dependent on personal motivation and concern about peer group standing.

Still another means of speeding up a lagging trial is for the judge to impose sanctions against the attorneys for wasting the court's and the client's time with unnecessary motions and objections, Kohn said. Attorneys should not be paid by the hour, and their fees should be "fine-tuned" by the judge according to their concern with getting to the heart of the matter in dispute, he added.

### IBM as Example

IBM was cited by one attorney as a model of an antitrust defendant astute at delaying tactics. One of IBM's best techniques is the exploitation of an overly broad government subpoena for company files, attorney James Halverson said.

The government often adds to the time eaten up in a large antitrust trial by adding claims and charges to the case after discovery and trial are under way; by asking for so much from an opponent that the defendant can easily justify dumping more documents on the Justice Department than it can readily handle: and by failing to focus early on specific remedies the government will seek if it wins its case, Halverson stated.

Asked what has gone wrong with the trial of antitrust suits, one attorney from the Justice Department's antitrust division suggested everything ran more smoothly and kept to a reasonable size before the introduction of computers and copying machines.

While some believe the presence of a jury makes an antitrust case move more quickly, others argued that jurors shouldn't be expected to be willing to stay away from their jobs for three to six months. In addition, jurors often don't understand the issues in a complex antitrust case, according to Judge Charles B. Renfrew from the U.S. district court in San Francisco.

Referring to the recent trial of Memorex Corp. vs. IBM, Renfrew maintained that when the jury was polled after the mistrial, many of the jurors said they felt they shouldn't have to decide such complicated issues.

Other witnesses appearing before the antitrust commission recommended changes in the laws rather than the procedures. Donald I. Baker, former assistant attorney general in charge of the Antitrust Division and now in private practice, maintained that if a firm accused of monopolizing an industry clearly engaged in "bad" conduct, the troublesome problem of what markets the firm dominated need never be a matter requiring proof. When a company's conduct is ambiguous, the government will have to rely on some proof of market power and control, he said.

Prof. John Flynn from a Utah university, however, argued for the abolition of the requirement that bad conduct be proved to the court. He favored the use of clear definition of a percentage or share of the market alone to show monopoly power.

Overall, the commission's initial set of hearings revealed a desire on the part of nearly all those testifying to see the body try to smooth the way for big antitrust cases under the rules and laws that already exist. "There are sufficient sanctions against delays in the laws and many in the procedures," Kohn said. "I think the commission should point that out.

"Discuss this field in an irreverent manner so you can get away from the idea of making statutory changes," the attorney continued. "Remember that with complex antitrust cases like AT&T and IBM, you're dealing with problems as political as the Bakke reverse discrimination case or the questions on abortion," Kohn said.

# CCIA Views AT&T Filing

(Continued from Page 53)

and data communications network equipment suppliers, he added.

Innovative companies can always compete, Biddle said, but "competing against a $35 billion company that can write its own protocols for its own system in such a fashion that its own hardware works and others' doesn't is a potential threat."

While granting that innovation by AT&T in data communications could be good for everyone, Biddle commented that AT&T, in its traditional competitive strategies, has thought and acted like a monopolist.

However, if the FCC grants the petition, the CCIA's response will be similar to that on the Satellite Business Systems decision. CCIA will push for:

- Advance disclosure of hardware interfaces to allow suppliers to manufacture equipment.
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- Prohibition of bundling and joint selling.
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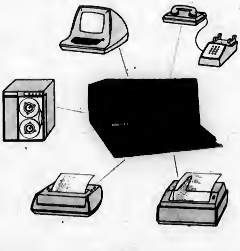

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# CI Notes

## UCS Reorganizes Into Three Sectors

KANSAS CITY, Mo. — United Computing Systems, Inc. (UCS) has reorganized, forming three major divisions within the company.

The Network Information Services Division combines all sales and marketing responsibilities for remote computing in North America. G.J. Lorenz, UCS president, will head the division.

The Business Information Products Division consolidates several existing departments involved with the development and marketing of business-oriented software and application products.

United Computing International, a newly formed company, will operate as a division of UCS, coordinating all international business and providing a framework for further expansion outside the U.S.

## Sorbus to Maintain Qume Sprint Printer

HAYWARD, Calif. — Qume Corp. has contracted with Sorbus, Inc. to provide maintenance on its recently announced Sprint 5 daisywheel printing terminals.

The agreement provides for initial service in major metropolitan cities and will expand to nationwide coverage.

Qume will supply parts and training materials, enabling Sprint 5 users to contract directly with Sorbus for maintenance.

The Sprint 5 is Qume's first major departure from the word processing systems marketplace.

Sorbus, with 160 key city locations and nearly 1,000 field personnel, services more than 20,000 data communications terminals.

## Hadrian Gets UK Rights To EMM System 800

ENCINO, Calif. — Electronic Memories & Magnetics Corp. (EMM) has completed an agreement to sell exclusive UK rights for its System 800 to Hadrian Computer Services Ltd., according to Trude C. Taylor, EMM's president and chairman of the board.

The System 800, a small business system, will remain proprietary to EMM, including the EMM-designed CPU, memory cards and various controllers.

EMM's agreement with Hadrian, a wholly owned subsidiary of Cattle's Holdings Ltd., covers three separate categories; inventory purchase and sale; manufacturing and purchase; and licensing.

Terms of the agreement specify that Hadrian will assemble the System 800 while EMM will continue to manufacture major subassemblies. The EMM-developed system software will be licensed to Hadrian, but Hadrian will develop its own application software.

The initial agreement is said to involve about $500,000, which includes a license fee, purchase of available inventories and arrangements for royalties.

A price/cost evaluation will be performed every six months between the two companies on production hardware. EMM has guaranteed Hadrian it will continue to manufacture the System 800.

The agreement is expected to be a forerunner to future System 800 pacts. "We are currently discussing agreements with several European and U.S. companies," according to Thomas S. Benson, EMM vice-president of business development.

# Super Shorts

Brandon Applied Systems, Inc. has purchased the assets of Montgomery-McDonald, Inc. for cash and notes. Montgomery-McDonald provides data services to casualty insurance companies and brokers.

---

Russell W. Laxson, vice-president of public affairs for Honeywell, Inc. has been appointed by the U.S. Senate to the newly created National Commission on Social Security. The nine-member commission will conduct a two-year study of the Social Security system. Laxson, who retired from Honeywell on June 30, has been vice-president of public affairs since 1968.

---

At its recent meeting in Washington, D.C., the Electronic Funds Transfer Association elected Roland R. Eppley Jr., président of Eastern States Bankcard Association, as its chairman of the board of governors.

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Datapoint Corp., Computer Automation, Inc. and TRW, Inc. jointly announced that all litigation pending in Los Angeles County Superior Court and U.S. District Court in Los Angeles has been settled.

---

Data Terminal Systems, Inc. will establish a marketing, manufacturing and administrative facility in the Republic of Ireland. The company also announced the appointment of Karl Seller as marketing director for Europe.

---

Hospital Financial Services, Inc. (HFS) has become an independent supplier of Digital Equipment Corp.'s Datasystems. HFS' financial applications currently operational on Burroughs, Honeywell, IBM, NCR and Univac mainframes, are now available on DEC PDP 11/34s and PDP-11/70s.

---

Datapoint Corp. has named the International Sales Group, inc. of Boston, London and Frankfurt to handle the distribution of Datapoint's OEM tape and disk drive products in Western Europe. Datapoint's wholly owned subsidiary, Amcomp, Inc., has become the Peripheral Products Division of Datapoint.

---

Pertec Computer Corp. (PCC) has signed an exclusive wholesale agency agreement with Compelec Electronics, Ltd., London, for the distribution of small business systems in the UK and Ireland. In other news, PCC signed a two-year agreement with Datum, Inc. to provide field maintenance for its line of minicomputer peripheral equipment.

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Chase Computer Corp. of Baton Rouge, La., has opened a branch office in San Francisco. In addition, Caere Corp. has formally made Chase the exclusive end-user retail marketing representative for Caere products.

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Lundy Electronics & Systems, Inc. has entered into an agreement with NCR Corp. whereby NCR will manufacture Lundy-developed document reader/sorters used by banks. Lundy received $3.5 million, which includes the cost of license fees and technical assistance to NCR during production startup.

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## *Price Reductions Anticipated*

# Floppy Shipments to Grow 33%/Year Until '81

WELLESLEY, Mass. — Total floppy disk unit shipments will grow at an average annual rate of 33% until 1981. However, the growth in dollar value for independent IBM-type floppy disk drives will not keep pace with the overall growth rate because of anticipated price reductions.

These predictions were among the conclusions reached by Venture Development Corp. (VDC) in its recent study, "Floppy Disk Markets II."

VDC senior consultant Edward A. Ross explained that the slower estimated dollar value growth rate of 27% will result from price reductions brought about by more advanced tooling. He said prices have not reached rock bottom, as some industry observers assume.

Some highly touted floppy disk markets including the point-of-sale area and industrial control have failed to develop, according to VDC. However, other segments such as word processing and hobby computers have grown rapidly.

Although floppy disks compete with many media types including magnetic tape, hard disks, cassettes and the emerging bubble memories, VDC forecast that floppies will be immune to encroachment by these technologies at least through the early 1980s, particularly for applications in which a permanent or semi-permanent library is required.

For the long term, VDC rated bubble memory technology as the most serious challenge to floppy disks. However, bubble memory, according to VDC, will displace floppies only in applications for which floppies would be a doubtful choice — for instance, in situations in which the removal of the diskette itself for library storage is not contemplated or if the environment is beyond the floppies' capability (about 10% of the floppy market).

Two trends in response to user demands for either greater capacity or for lower cost and smaller size were identified by VDC.

By 1981, Ross predicted, 75% of all floppy drives sold by independents will be double-density, compared with only 5% in 1976.

Moreover, the trend toward "minifloppies" will cause that market to grow 238% per year in units shipped and 117% in dollar value through the early 1980s, VDC estimated.

Ross pointed out, however that these figures are lower than some other industry analysts' projections. Contrary to some expectations, minifloppies will never completely replace full-sized units, except perhaps in word processing and hobby computer applications, the VDC consultant concluded.

The 165-page report projected world floppy disk markets by product type and application. According to Ross, all product types except non-IBM-compatible full-size types will show growth through 1981, with the small business system overtaking the intelligent terminal as the primary application.

The study is available from Venture Development Corp., One Washington St., Wellesley Hills, Mass. 02181.

## Executive Corner

- Loretta Clayton has been appointed vice-president of administration, while Robert Hutzel has been named vice-president of marketing and Ray McInnis has been appointed vice-president of computer facilities management marketing at Planning Research Corp. Data Services Co.
- Philippe J. Kuperman has been named director of finance and administration for Informatics, Inc.'s International Marketing Division.
- Walter P. Olson has been elected secretary of Penril Corp. by the company's board of directors.

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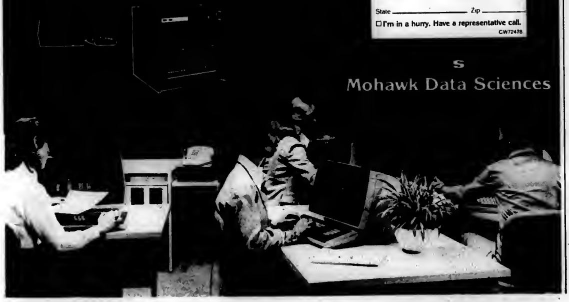

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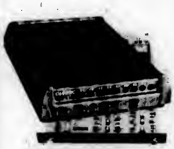

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Our expanding operations and ever growing line of new products offer the diversification of interest that make any career a challenge. With more than 8% of revenue devoted to Research and Development, one of the highest in our industry, we are deeply involved in the development of bubble memories, fiber optics, large scale integration, laser application, advanced software and many other sophisticated techniques.

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The new ISS Expandable File Family of Disk Memory Systems is receiving unprecedented acceptance in the OEM/PCM marketplace. Our established record of technological firsts continues with the EFF. Now is your opportunity to join the team that advanced the state-of-the-art to create this highly successful disk memory product. The combined resources of ISS high technology memory development, and the prominent position of Sperry Univac in the main frame computer business, is the right combination for your future. You can join in this success and our future growth if your qualifications match one of the positions below.

### STAFF ENGINEER

In this highly desirable position, you will be responsible for designing channel simulators and robot exercisers for large-scale disk drive systems. Demonstrated proficiency in micro-coding and digital design required.

### PRODUCT TEST ENGINEER

We are seeking an individual with a strong test-oriented background in disk drives and controllers who will be responsible for the planning and coordination of test activities designed to establish the finished products' integrity. Detailed duties will include the specification and coordination of the test activity as well as the analysis of any problems encountered in the test. If you have a BSEE and test experience, you should not pass up this opportunity.

### MAGNETIC RECORDING ENGINEER

If your experience lies in high-speed analog circuits and communications channels, you may qualify for this challenging position. Read/write techniques desired.

### Q.A. ENGINEER

We are currently seeking an aggressive, self-motivated engineer to evaluate electromechanical and soldering assembly problems for immediate and long term corrective action. Because we are a high volume manufacturer, your assignments will be diverse and challenging.

### RELIABILITY ENGINEER/ STATISTICAL ANALYST

You will be performing evaluations of computer peripheral products. Responsibilities include statistical assessment of quality and reliability data, mathematical reliability modeling and use of EDP systems for statistical data base maintenance. BS degree in Engineering, Mathematics, Statistics, or Computer Science required.

### PROJECT ENGINEER

We are seeking a well rounded analog design engineer who wants to work on a total product. If you are an EE with experience in servo and circuit design, this position offers you a ground floor opportunity on our new memory systems product.

### PRODUCT DEVELOPMENT ENGINEER

We need a talented person with a BS in physics, engineering or materials science to conduct independent process and materials investigations. You should have a working knowledge of glass bonding techniques as well as matching techniques for ceramics (lapping and grinding). Knowledge of the physics of magnetics desirable. Must have good "hands-on" process development experience.

### FAILURE ANALYSIS ENGINEER

An immediate opportunity exists for a dedicated individual in our Failure Analysis Engineering Department. You will perform professional engineering analysis of problems encountered in Test Operations as well as analyzing field related problems. Responsibilities also include initiation and tracking of corrective action to enhance product reliability. BSEE and at least 4 years of experience in design of failure analysis of disk drives and control units required. Must be able to analyze problems at the sub-system level, and to achieve resolution at the circuit level.

### MICROPROGRAMMER

As a firmware engineer, you will be working in a state-of-the-art R&D group designing disk memory controllers. To qualify for this highly creative position, you should have a BS degree or equivalent and knowledge of microcoding. Prefer experience with disk controllers and/or plug compatible units.

### PRODUCT SPECIALIST

This professional position is responsible for providing technical support on ISS Disk Subsystems to our PCM Field/Customer Organization. Close interfacing with various in-house engineering and manufacturing departments as well as some worldwide travel will be required. You should have experience on 360/370 type equipment and have had some exposure to microcodes.

### THIN FILM HEAD DEVELOPMENT

Outstanding opportunity for an engineer who wants to perform the research and development utilizing semi-conductor technology. Experience in thin film processing is required. Prefer magnet thin film deposition and processing.

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We seek a process engineer to evaluate process parameters, suggest modification and improve the quality of magnetic disk products. You will work with a team involved in high density recording media development. Experience in pigment technology or polymer science is desirable. Some exposure to the mixing/dispersing equipment helpful.

### MANAGER, MEDIA MANUFACTURING ENGINEERING

In this position you will have total responsibility from raw materials to final product (head/disk assembly). You will manage a group of technical personnel involved in disk manufacturing engineering and process control. To qualify, you should have proven leadership ability and previous experience in media manufacturing or development.

### MECHANICAL ENGINEER, MANUFACTURING

This is a challenging position for someone who enjoys troubleshooting and understands process equipment. You will utilize your knowledge of small mechanisms, hydraulics, pneumatics and vacuum systems while troubleshooting our equipment such as ball mills, ovens, pumps, mixing equipment, plating tanks and craters. Familiarity with electrical, electronics and pneumatic logic is helpful but not mandatory.

We also have other challenging positions available in the following areas:

- Analog Engineers
- Servo Design Engineers
- Mechanical Engineers
- Media Engineers

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- Study and recommend hardware design features to enhance testability and fault isolation. Design and implement test programs.

### COMPONENT ENGINEER

Interfaces with IC vendors and design groups regarding component developments and applications. Selects and tests components, advising on circuits, applications, failure modes, reliability and cost.

### SYSTEMS PROGRAMMER

Design, develop, and test advanced 1100 series operating systems for current and unannounced products. Background in executive and language processors development desirable, preferably on large-scale general purpose mainframes.

### LOGIC DESIGNERS

- Logic design, documentation, and test of central processors. Experience in definition and design using microcoded architecture.
- I/O definition, logic design, simulation, and checkout of prototype. Background in logic design of I/O channel or control unit is desirable.
- Definition and logic design implementation and engineering test of CPU components such as instruction processors, I/O units, and high speed buffers. Knowledge of hardware/software organization, SSI/MSI/LSI implementation, and microprogramming.

### ELECTRICAL ENGINEERS

- System and component circuit design for next generation systems. Experience in circuit design, oscillator design, clock systems. Will work with CAD, mechanical design and logic design groups.
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- Definition, design, and development of semiconductor memory subsystems.
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### ELECTRICAL ENGINEERS

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- System hardware design—cooling, acoustics, power distribution, mechanical design co-ordination.
- Data Encryption—systems development and evaluation.
- Custom subsystem design—background in government agency requirements desirable.

### PROGRAMMERS

- Automated Test Processing—system development
- New systems design verification—test programming

### ENGINEER/PROGRAMMERS

- Hardware and Subsystem Design—verification for new systems development.
- Diagnostic programming.

### SYSTEMS ENGINEERS

Systems Definition and Specification—knowledge of contemporary technology important. Engineering and Software development liaison involved.

### ENGINEER/MICROPROGRAMMERS

- Specification and Evaluation of microarchitectures for new systems development.
- New systems design, processor and I/O.

### LSI DESIGN ENGINEERS

Minimum of 3 years experience in the design of bipolar and/or MOS LSI circuits and must have designed at least 2 LSI circuits preferably at an IC house.

### SOFTWARE DEVELOPMENT

### PROGRAMMERS

3 to 12 years experience in the design and implementation of small, medium and large scale operating systems software, data base systems, communications and compiler development. Positions are also available in QA testing and integration activities.

### APPLICATIONS DEVELOPMENT

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Responsibilities include feasibility studies, planning, design, specification and user training for new and existing computer systems. Must have good oral and written communication skills and a desire to help users improve the business information process. Should have a college degree or equivalent experience and a minimum of 5 years of systems and programming experience. Knowledge of COBOL and interactive systems a plus.

### PROGRAMMERS

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### PROGRAMMER/PROGRAMMER ANALYST—SPECIAL SOFTWARE

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### DESIGN ENGINEER

Requires BSEE or equivalent and three to five years experience in digital logic design, mini-computer I/O experience.

### TEST ENGINEER

Requires a BSEE or equivalent experience. Will be responsible for writing test procedures, test floor support, and new procedure liaison. Background in semiconductor memory design and theory preferred.

### QUALITY ENGINEER

Specify and procure component test equipment, develop test programs for integrated circuits, design and build test circuits for special applications, support incoming test operations. Requires BSEE or equivalent and two to five years experience in at least one of the following areas: vendor support (electronic components), product evaluation/reliability, design and implementation of test procedures and fixtures leading to first article acceptance and troubleshooting failed components.

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Responsibilities include all phases of computer manufacturing including processes, methods, and procedures, product flow and productibility. Requires a degree or equivalent experience, with at least two years in P.C. board assembly, wire wrap, and cable and harness assembly.

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### MICROPROGRAMMERS

Write, debug, release microprograms associated with terminals and communications processors. Involves large, high-speed micro-programmed processors and controllers; a wide variety of processor-on-a-chip microprocessors; soft microcode and firmware (microcode burned on ROM). Generation and use of a variety of assemblers, cross compilers and higher level languages may be required. BSEE w/experience.

### LOGIC DESIGNERS

Apply state-of-the-art digital switching technology to the detailed design of computer and terminal logic functions. Use LSI, MSI and SSI circuits. Generate logic equation files and logic diagrams using computer aided design techniques. Responsible for design functionality, testability and maintainability of circuit cards. Determine cost versus performance trade-offs in selecting types of circuits and components. BSEE w/experience.

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### SYSTEM PROGRAMMERS

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Will be responsible for application software implementation at division and subsidiary locations. Heavy manufacturing accounting knowledge is required. Prior experience in software installation is required

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Heavy COBOL experience on 370 series or HP 3000 mainframes. Experience should include familiarity with order entry and general accounting applications. Knowledge of DL1, CMS and CICS desirable

## DOS/VS Systems Programmer

Experience with IBM 370 internals which should include VM, CMS, DOS/VS advanced functions, CICS/VS, DL1, PANVALET and VTAM

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This position requires solid exposure to data base management and HP 3000 or similar technical expertise. Responsible for communication network management, on line security systems and internal technical consulting

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Responsible for financial methods analysis, procedure evaluation, and manual system analysis corporate/division environment. Utilize such techniques as work measurement, simplification, forms analysis, cost value analysis, recommend revised or new methods, forms, or procedures to improve operations control

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# New Corporate VM/370 Data Center

**Northwest Industries, a $2 billion multi-industry company, is establishing a VM/370 interactive data center. This IBM 158 AP facility will be utilized for decision support and mathematical modeling applications.**

**We are assembling a topnotch staff to develop and support this data center. The emphasis is on SOFTWARE EXCELLENCE with the following positions open:**

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**Total data center responsibility with a staff of 10 software and operations professionals. Will provide a superior level of service and an enhanced VM/370 CP/CMS and communications environment.**

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## • SENIOR SYSTEM SOFTWARE SPECIALISTS (2)

**VM/370 CP/CMS operating system responsibility. Will develop, generate, and support an enhanced operating system.**

**Should have in-depth VM/370 experience including modifications and support.**

## • SENIOR SYSTEM SOFTWARE SPECIALIST (1)

**IBM 3705 based communications responsibility. Will develop, generate, and support an effective communications service.**

**Should have in-depth communications experience including network design and support.**

**These positions provide a high degree of challenge, reward, professional development, and offer an attractive compensation package. To explore these opportunities, please call Michael Delaney, Corporate Staff Personnel Manager, at (312) 876-7000, ext. 591, or respond with a resume or letter to Laurence T. Burden, Director—Management Information Services.**

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New from Source Edp!

# 1978 Local Metropolitan Computer Salary Survey

Now you can compare your current salary with hundreds of other computer professionals working in or near your own geographical area. Source Edp, North America's largest recruiting firm specializing in the computer field, has just compiled a timely survey of local salaries in the computer profession. The survey covers all areas of professional discipline in programming, software, information systems, marketing, etc. It shows salaries by length of experience, size of installation and includes all management levels. You can also compare your current compensation on a city by city basis with salaries paid in metropolitan areas across the U.S. and Canada as well as national averages.

## For your Free copy, call the Source Edp office nearest you.

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**If unable to call, write: Source Edp, Department C**
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**IT'S HAPPENING**
**Saturday, July 29th**
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### THE COMPANY

**Here's a brief preview of who we are and what we do. We're the Technical Services Division of Sperry Univac, whose mission is to provide advanced systems design, application analysis, programming and operations support. Principal clients are located at Dahlgren, Virginia and Patuxent River, Maryland.**

### THE LOCATION

**Both Dahlgren, Virginia and Patuxent River, Maryland are only 60 miles from Washington, D.C. Nearby communities Fredericksburg, Virginia and Lexington Park, Maryland provide a comfortable lifestyle, yet retaining access to the city.**

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**1901 North Moore Street,**
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# Computer Systems Architecture

Our Systems Architecture group is looking for talented professionals to help design future high-performance computer systems. You should have a broad educational background in EE or CS with emphasis on computer architecture or design and be familiar with most of these areas: computer systems organization; storage systems organization; operating systems; ASSEMBLER high-level languages; data base/data communications fundamentals. Combined hardware and software experience and familiarity with System 370 is desirable. We have immediate openings for the following positions:

### STORAGE AND DB/DC SYSTEMS ARCHITECTS

You will be a specialist on an architectural team and perform key functions in designing the architecture of future systems. You have experience in storage, data base, or data communication sub-systems. Please indicate 4911-E on your response.

### OPERATING SYSTEMS ARCHITECT

You will be a software systems specialist on an architectural team. You have an architectural orientation and experience with operating systems, especially MVS. Please indicate 4912-E on your response.

### SYSTEM PERFORMANCE ARCHITECT

You will be the performance evaluation specialist on an architectural team. You are a qualified professional in computer system performance measurement, evaluation and modeling with emphasis on architecture or design. Research into key areas of new product development will be a major responsibility. Please indicate 4913-E on your response.

Qualified candidates for the above positions are invited to direct their response to Employment Department, Amdahl Corporation, P.O. Box 5070, Sunnyvale, CA 94086. We are an equal opportunity employer.

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Applicants must have a BS in engineering, 2 yr. experience in systems analysis, and FORTRAN proficiency. Oral and written communications skills are a must. Pluses are experience with structures, graphics, and interactive systems. Send detailed resume and salary requirements to

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Positions require a high degree of creativity & innovation for the primary activity of designing & developing comprehensive and fully-automated tests and testing tools. Other activities include reviewing all aspects of product quality from an end-user's perspective such as product capabilities, user interface & human engineering, user manuals, performance, etc.

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Requirements include 3-4 years OS/MVS experience; exposure to OS/MVS systems internals; strong ALC background, particularly in Data Management. Specific experience with ASM2 helpful. Will be responsible for the implementation and conversion of DASD management system; developing software to support DASD management

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Requirements include a minimum of 3 years experience in 360/370 OS/VS environment, proven ability in OS JCL and UTILITIES, experience in COBOL or ALC, working knowledge of SMF record formats. OS/VS Dump Debugging. TSO, WYLBUR PLI, or BASIC would be helpful. Will be responsible for the Installation/Enhancement/Maintenance of system software packages; developing software to reflect system resource usage

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Mr. Tete Lindahl, Computer Center
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(309) 298-1177

Deadline for applications: August 10, 1978. An Equal Opportunity/Affirmative Action Employer.

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Will provide technical support to inspection function, establish Q.C. procedures, standards, and vendor liaison. Requires BSEE and 5-10 years of experience in an increasingly responsible capacity in computer or related manufacturing concern.

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Will be responsible for the evaluation of new products prior to manufacture. Will also coordinate the development of information systems to capture product field performance data. Requires BSEE and 5-10 years of experience in an increasingly responsible capacity in computer or related manufacturing concern.

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PROGRAMMER/ANALYSTS AND
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## PROGRAMMER/ANALYST (2)

(One experienced with financial applications and one experienced with manufacturing applications)

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Computer or information science major to assist with the design, establishment, maintenance and control of the Data Base for a $100 million plus manufacturing organization. Candidates should have at least two years of systems analysis and design experience plus two years of programming or other data processing or information systems experience. Experience with a manufacturing or non-manufacturing company having a highly developed Data Base management system in operation would be helpful. Salary to $20,000, plus bonus.

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SYSTEMS ANALYST

PROGRAMMER

Excellent growth opportunity for DOS COBOL Programmer who also has analyst experience. Responsibilities will require both analysis and programming expertise. Minimum qualifications: baccalaureate degree with at least 2 years experience in user oriented information systems. Send resume and salary history to Personnel Office, NORTHAMPTON COUNTY AREA COMMUNITY COLLEGE, 3835 Green Pond Road, Bethlehem, PA 18017. Completed applications must be received or postmarked no later than August 10, 1978. AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER.

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ADR's diverse product line is state-of-the-art. Our systems range from on-line programming systems to language translators; from text processing to performance measurement. IBM technological advances are usually heralded by new ADR products. ADR software products are rated #1 in the 1977 Datapro survey — surpassing every other company in the number of products (4) honored by Datapro.

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If you are a capable IBM Assembly language programmer and consider yourself a System Software Specialist, then you definitely should consider ADR. We have openings at all levels for qualified programmers and analysts who have the capabilities for developing sophisticated, state-of-the-art software. Experience with on-line systems (CICS, TSO, etc.) or knowledge of OS internals is a definite plus. If you have participated in the development of any type of software packages — system, utility, or application — we would really like to talk to you.

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SYSTEMS is an innovative, growth-oriented leader in the field of 32-bit mini-computers and a pacesetter in providing career advancement to creative programming and writing professionals. We are located in Fort Lauderdale, Florida, an area of unparalleled year-round living experience. SYSTEMS offers you an opportunity to enhance that experience with unparalleled career opportunities.

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Programming positions which involve the modification and revision of existing software products, including operating systems and language compilers, to resolve problems, to implement new features and improvements, and to generate all materials packaged for customer support. Applicants must have 1-3 years Assembly Language programming experience, the motivation to work individually in problem definition and solution, and a customer-oriented empathy.

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Positions require heavy involvement in the software engineering process. Successful candidates will generate a range of user documentation which compliments SYSTEMS' software product set. Team contribution is dedicated to the production of quality years as a technical writer or 2 or more years as an applications programmer with proven writing skills.

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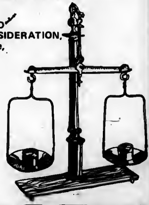

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The Anaconda Company is seeking an experienced scientific Programmer/Analyst to provide division level support to engineering and scientific personnel. Responsibilities include determination of computer applications, systems design, programming and supporting documentation. A Bachelor's Degree in Physical Sciences (Mine Planning or Geology) or Math with a Physical Science emphasis, combined with two years of Fortran computer programming experience or equivalent job related experience is acceptable. Desirable to have experience with COBOL and assembly language.

From past to present Anaconda has built for the future. Shouldn't you build for the future too? We offer an excellent salary and company benefits. For immediate consideration please send your resume in confidence to: The Anaconda Company, Dept. GR, 660 Bannock Street, Denver, Colorado 80204. We are an equal opportunity employer m/f.

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We are a key software development group which provides primary support for all of Digital's small systems development activities. Currently, we have several openings in the following areas:

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We're looking for several self-starters with the capability and desire to impact our Operating Systems Development group.

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## Compiler Development

We are looking for senior people to participate in the design, implementation, support, and evaluation of languages. Our main requirements are strong interest in compilers and experience in identifying language user needs. Compiler experience working in a high level implementation language such as PASCAL or pL/1 is required.

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We seek individuals who have solid system software backgrounds on RSX-11M/S, RSX/1AS, or RT-11. Qualified applicants will provide definition, design, and implementation activities in one of the following areas: microprocessor software, communications, links disciplines, network software.

*For further information, please call Dick MacDonough at (617) 493-9047, or write him at Digital Equipment Corporation, Dept. B724 3807, 146 Main Street, Maynard, Massachusetts 01754. We are an equal opportunity employer m/f.*

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Background should include a degree in Business, Mathematics, Computer Science or equivalent in experience plus actual implementation experience with CICS, ATMS and/or STAIRS. Some experience with MVT, MVS, ASP and/or JES 3 helpful but not required. PL/1 background preferred. You will start by implementing and maintaining CICS/VS system and progress to other system programming areas.

## TP NETWORK COORDINATOR

Background should include: a degree in Business, Mathematics, Computer Science (or equivalent in experience) plus actual TP Network experience including equipment evaluation, troubleshooting and operations interfacing. Duties will include the maintenance of a highly sophisticated TCAM message control program. CICS and PL/1 experience helpful but not required. TCAM/Assembler background preferred.

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### FIELD ENGINEER

Responsibilities include: installation and maintenance of computer-related equipment, design and implementation of enhancements to existing hardware, assisting users with hardware-related problems.

Minimum qualifications - Computer Specialist I: Associate's degree or equivalent experience in Data Processing or Electronic Technology (additional experience highly desirable). Salary range: $10,572 to $16,428; starting salary normally not to exceed $11,856.

Resumes, stating position desired, should be submitted no later than July 28, 1978 to:

**Mr. Richard C. Schofield, Jr.**
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**Computer Services, Kingsbury Hall**
**Durham, N.H. 03824**
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Minimum qualifications - Computer Specialist II: Bachelor's degree or equivalent experience plus one year's pertinent experience. Salary range: $11,616 to $18,048, starting salary normally not to exceed $13,020.

Resumes should be submitted no later than August 4, 1978 to:

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Please send resume, current salary, and salary requirements to:

Director of Data Services

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A strong programming and software implementation background and experience in communication software will qualify you for programming positions within our Networks Development area.

### Communications Software Field Support

Will provide technical and consulting support to customers worldwide on Communications Network software for CYBER 170. Tasks involve problem diagnosis, development and teaching of seminars, consulting to customers, technical writing and special project design/implementation. Requires communications and large systems experience. Excellent opportunity for both intermediate and senior level people.

### Systems Evaluation

You will be involved in the performance analysis of compiler, data management and network products. Positions include performance test base development, test plan development and development of performance analysis tools for standard scientific software products.

### Software Technical Writers

Begin your career in technical writing, or allow us to make use of your experience in our technically challenging environment documenting state-of-the-art software for the world's leading large-scale computer systems. You will be involved in preparing user manuals supporting CDC's software product line, including ALGOL, COBOL, FORTRAN, PL-1 and data management languages. Ideal candidate will have BS degree in Computer Science with some writing experience, or a combination of equivalent skills/education.

Control Data offers a challenging and rewarding work environment and with us you will receive recognition and technical growth. We provide excellent compensation and comprehensive benefits, including dental and retirement plans. Qualified candidates are invited to send resumes, stating position of preference and salary requirements to Karen Hardy, Dept. 50A, 215 Moffett Park Dr., Sunnyvale, CA 94086. (408) 734-7434.

CONTROL DATA CORPORATION

An Affirmative Action Employer M/F

# Programmers/Analysts

We are looking for Data Base Administration Specialists, Systems Analysts, and Applications Programmers for challenging assignments on both IBM JES3 (IMS/MVS) and mini-computer applications.

## DATA BASE ADMINISTRATION SPECIALIST

A minimum of two years' experience in the planning, design, development, implementation, and administration of data base management systems is required. Knowledge of IMS;DB DC preferred. Knowledge of TOTAL, System 2000, or other data base management systems will be considered.

## APPLICATION PROGRAMMERS

A minimum of two years' experience, using business oriented languages is required. Knowledge of OS/VS/MVS, JCL, COBOL, Structured Programming and OLI is desirable. Experience with IBM, MVS, Time Sharing, IMS, MARK IV, Mini-Computer Systems or data communications would be a distinct advantage.

## SYSTEMS ANALYSTS

A minimum of two years' experience in the development of large-scale commercial data base applications or mini-computer systems is required.

Experience with Engineering, Materiel Control, and Financial Systems desirable. Degree preferred

**Send resume to:**

**Ford**

**Car Engineering**
**Attn: J. Phillips**
**Product Data Systems Dept.**
**Room 1670 FMCC Bldg.**
**The American Road**
**Dearborn, Michigan 48121**

*An Equal Opportunity Employer M/F*

---

# IMS SYSTEMS PROGRAMMERS

## THE ARIZONA BANK

We have a very progressive data processing environment that offers challenging and rewarding opportunities as well as excellent salaries and benefits for qualified individuals. We are presently seeking experienced software personnel in the following areas:

IMS DB
- DBD and PSB Gens;
- DB Backup/Recovery/Restart;
- DB Design a plus

IMS DC
- IMS Gens/PTF Maintenance;
- DC Performance Analysis/Tuning;
- Knowledge of TP Concepts/protocols

If you are qualified and would enjoy working in a dynamic atmosphere that offers the most current IBM hardware and software technology, please call or send resume complete with salary history and requirements to:

**The Arizona Bank**
**Attn: Ms. Mary Ann Jones**
**Operations Center Employment Office**
**P.O. Box 2511**
**Phoenix, Arizona 85002**
**(602) 262-4275**
An Equal Opportunity Employer M/F.

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# COMPUTER PROFESSIONALS

## Energy Related Projects

- SOFTWARE ENGINEERS (LEVELS II-IV)
- MODELERS
  - Aerodynamic high-temperature flow
  - Thermodynamic Emissions (Chemical equilibriums, $So_x$ $No_x$ kinetics)

The Montana Energy and MHD Research and Development Institute (MERDI) has positions open for Computer Professionals with experience in scientific and/or commercial environments. Engineers with a working knowledge of disk and terminal oriented computer systems, plus a solid background in Fortran and PL-1. Bachelor's degree with 2-10 years experience, depending upon position. DG-AOS usage is a plus.

We offer competitive salaries, liberal relocation allowances and an excellent benefit program. Please send your resume in complete confidence to:

**Personnel Manager**
**MERDI**
**P.O. Box 3809**
**Butte, Montana 59701**
*An Affirmative Action/Equal Opportunity Employer*

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**CAREER OPPORTUNITIES IN DATA PROCESSING FOR THE EDP PROFESSIONAL**
**In the New York Metropolitan Area**

### IMS/Systems/Programmers
**$17-30K**

IMS/Internals
IMS/Sysgens
IMS/Call Profiles
MVS/Internals
Performance Tuning Evaluations

### IMS Data Base Designers
**$20-32K**

BAL/COBOL
IMS Utilities
Hierarchial Data Base Structure
Logical & Physical Relationships
Randomizers
3270 CRT Screens-MFS
CICS, UCC Data Dictionary
GIS, ADF

### CICS Sys/Programmers
**$17-30K**

CICS Internals
CICS Sysgens
BAL
Screen Formatting
MVS Internals
OS JCL & Utilities

### Burroughs Software Mgr
**$25-30K**

Supervise 6-8 systems programmers. Exclnt written & oral communications. Make enhancements to new & existing systems. Burroughs (B 6700/6800/7700).

### Proj. Managers (Banking)
**$27-34K**

Strong design & analysis. Data base design & implementation. TP monitor techniques. Feasibility studies & proposals. Written & oral communications.

**Send resumé or contact**
**Robert Brosslofsky**

# DRUM

**150 Broadway, N.Y. 10038**
**(212) 233-7550**

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# COMPUTER SUPPLIES SALESPERSON

Los Angeles, California
Open territory
Salary commensurate with experience
• Full fringe benefits
Call Mr. Lavine 213/386-6831
or forward your resume to:
**ASSOCIATED DATA SUPPLY**
**3921 Wilshire Blvd. Suite 400**
**Los Angeles, CA 90010**

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# COORDINATOR COMPUTER ASSISTED INSTRUCTION (CAI)

Opening for fall semester. Master's degree in computer science with knowledge of curriculum and instruction development. Prefer experience in development of CAI programs and experience in training faculty to develop CAI programs utilizing HP 3000 (32 terminal capacity). Salary $18,000-$20,000 commensurate with experience. Send letter and/or resume to Dean of Administration. Telephone: (512) 358-6823. An Affirmative Action Employer.

**BEE COUNTY COLLEGE**
**Rt. One, Beeville, TX 78102**

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### Data Processing Manager

$16,000 - $22,000 Annually. Graduation from college with major course work in business administration, industrial management, or industrial engineering with three years experience in supervision of governmental data processing or an Associates Degree in Computer Science with five years experience in supervision of governmental data processing. Employee needs strong systems background. The employee develops and defines systems concepts and relates these concepts into efficient operative systems and programs.

Apply to Seminole County, Personnel Office, County Courthouse, North Park Avenue, Sanford, Fla. 32771. Seminole County is an equal opportunity employer.

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# COMPUTERWORLD CLASSIFIEDS WORK

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# DIRECTOR OF COMPUTER SERVICES

The director has overall responsibility for planning and control of computer services for instructional, administrative, and research computing, currently running on IBM 370/138 with DOS/VS, CICS/VS, VM370, TCP, Panvelet on-line with local and remote terminals minimum qualifications include a bachelors degree plus 5 years of data processing experience, 3 years of management or administrative experience in a data processing center, preferably at an institution of higher education, extensive experience at a working level in systems analysis and programming.

Salary level depends upon qualifications, salary range will be low to mid 20's.

Letters of application with resume, references, and transcripts are requested by August 1, 1978, and should be sent to Keith Klein, director of personnel, Waubonsee Community College, Sugar Grove, Illinois 60554. An Equal Opportuntly Affirmative Action Employer.

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# PROMOTE YOURSELF

## HOUSTON MARKET

## WIDE OPEN

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| Manager Oil & Gas Systems<br>(IBM 370/168, TSO, OS/VS 2) | $40,000 |
| Manager of Bank Systems<br>(large scale IBM) | $35,000 |
| Data Base Analyst<br>(IMS, TSO, UCC-TEN Data Dict) | $30,000 |
| Teleprocessing Internals<br>(MVS RI 3.7, JES 3, 3032) | $28,000 |
| IMS Internals<br>(MVS, TSO, IBM 3032) | $28,000 |
| IBM Assembler Specialist<br>(370/168, 3031) | $28,000 |
| MVS Internals<br>(IBM 3032, RAMUS DB/DC) | $24,000 |

**ADDINGTON & ASSOCIATES**
**PERSONNEL SERVICES, INC.**

3013 FOUNTAINVIEW, SUITE 200
HOUSTON, TEXAS 77057
(713) 780 8810

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# SYSTEMS ANALYST

Kennametal Inc., a leader in the cemented carbide industry, has several positions available for Systems Analysts in its expanding information Systems Department.

The successful candidate will have a degree in Computer Science (MBA desirable), at least three years' experience in the design of major data processing systems, and a background in large scale IBM, 370, OS/VS, CICS, IMS and COBOL. Project experience should include on-line order entry/inventory control systems, shop floor plant data collection, materiel requirements planning, and shop loading and scheduling.

The position offers an excellent salary and employee benefits program. Please submit resume and salary requirements to:

C.R. Quiggle

**KENNAMETAL, INC.**
**P.O. Box 231**
**Latrobe, PA 15650**
*Equal Opportunity Employer M/F*
*ER78-168*

# COMPUTER TECHNICAL AND MARKETING EXECUTIVES SOUGHT

Aggressive, rapidly expanding computer firm is looking for professionals with industry expertise in the following areas:

- **Computer Marketing**
- **System Software Development**
- **Application Software Development**
- **Hardware Development**

All replys confidential. Send resume giving experience and salary history to: **Personnel Director**

**Billinga Computer Corporation**
**2000 East Billinga Avenue**
**Provo, Utah 84601**

BILLINGS

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# Senior MICR Customer Support Opportunity

### UTILIZE YOUR STRONG TECHNICAL AND INTERPERSONAL SKILLS IN THIS EXCITING SUNBELT BASED CUSTOMER SUPPORT POSITION

With the Software Division of University Computing Company. This major division of UCC is the fourth largest vendor of proprietary software in the U.S. and is an internationally recognized leader in application packages for banks, savings and loans, and credit unions.

UCC is currently accepting applications for a Senior Customer Support Rep with its SUPER MICR product. The individual selected will assume a variety of interesting and challenging responsibilities including user evaluations, pre-installation planning, documentation, enhancement development user workshops, etc. This position, which is located at the company's home office in Dallas, will involve moderate travel in the U.S. and Canada. Salary, benefits and advancement potential are excellent.

To receive consideration, you must have 2-3 years ALC programming experience on IBM 360/370. UCC MICRO and/or CPCS and/or OOS CHECK experience, and good communicative skills are also required.

Interested parties should call or submit a detailed resume to: Henry Oliver, University Computing Company, P.O. Box 47911, Dallas, Texas 75247; (214) 688-7178.

**UCC**
**UNIVERSITY COMPUTING COMPANY**
*AN EQUAL OPPORTUNITY EMPLOYER, M/F*

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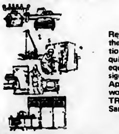
**ENGINEER**

## AMP INCORPORATED

Internationally known, renking emong the top 500 publicly held U.S. Industriels, and with major product lines in commerciel fields, has en opportunity for:

# SYSTEMS DESIGN ENGINEER

EE degree with experience in the computer industry. Software responsibilities will include complete systems support of PRIME 400 in-house time-sharing system as well as substentiel interactive computer graphics herdware being acquired. Will work with programming steff in the specification end development of engineering application software.



Responsibilities will include the specification and installation of both real-time date acquisition and process control equipment including the design of necessary interfaces. Applicants should have good working knowledge of FORTRAN end microcomputers, Sand resumé in confidence to:
Thomas J. Sullivan

**AMP INCORPORATED**

P.O. Box 3608
Harrisburg, PA 17105
*We are an Equal Opportunity Employer m/f*

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# DATA PROCESSING PROFESSIONALS

Atlantic States is a national recruiting firm searching for EDP specialists at all experience levels and with diverse systems backgrounds. Many openings nationwide. Fees paid. For selective handling, WITHOUT PRESSURE, mail your resume to: **ATLANTIC STATES PERSONNEL, P.O. Box 9928, Savannah, GA 31402.**

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## OUR STANDARDS ARE HIGH THEY HAVE TO BE

Our vice presidents personally hire each programmer/analyst (over 100 will be in 1978) because they know that a professional service firm's FUTURE IS YOU.

Immediate openings including Miami, Houston, Washing, D.C., Baltimore and Philadelphia areas. Call collect or send resume with current salary requirements to:

Mrs. Denna Keterba

**Data Technology**

6611 Kenilworth Ave., Suite 413
Riverdale, Maryland 20840
(800) 638-0811

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# SYSTEMS ANALYST

We are seeking several key individuals capable of assuming project management responsibilities for the development and implementation of large scale sophisticated banking systems. Initial assignments will be in such areas as EFTS, Central File, and On-Line Teller systems.

These are non-programming positions, however, candidates should have a programming background preferably in an IBM DOS environment. Experience with on-line systems and CICS is desirable but not required.

If you are interested in a challenging opportunity, personal growth and earnings potential limited only by your ability, and the contentment of working in a pleasant midwestern city, please contact:

Gene Ketchmark, AVP
**BRENCO AUTOMATION CENTER, INC.**
717 Mulburry, Suite 503
Des Moines, Iowa 50308
(515) 283-2418
*A Subsidiary of*
*Brenton Banks, Inc.*

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# FLORIDA EAST-CENTRAL-WEST

PROGRAMMERS, ANALYSTS, ENGINEERS & MARKETEERS. Excellent client Co's, need career oriented individuals with 2 or more yrs exp. in DP.

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| Man. Analysts | $25K |
| Scien/PDP-11 | $24K |
| EE-Fortran, T.P. | $22K |
| Finan, OS CICS | $24K |
| Progs, COB. BAL | $18K |
| Proc Ctrl Mktg | $24K |
| Firmwre, R&D, EE | $30K |

Please submit resume with current salary in TOTAL CONFIDENCE to:

**FRANK LEONARD Personnel**
1211 No. Westshore Blvd.
Suite 100
Tampa, FL 33607
(813) 872-1853

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# SAN DIEGO

Mini-Computer & Software Sales (DEC) 3 years minimum experience in Computer Seles with Gen'l Accounting or Mfg. Applications. Opening for Seles Mgr. end Salesman - San Diego, Orange Cro., & Los Angeles erea. Fantastic Seles Leads & Opportunity. Contact Mr. Knudsen c/o Digitel Data Systems, Inc., San Diego, (714) 292-5855.

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# EDP PROFESSIONALS

Multi-regional CPA firm with expanding consulting practice has openings in six locations for EDP consultants. Three years of EDP experience required. Advanced degree, consulting experience or accounting background a plus. Limited travel. Send resume to Bob Hoover at McGladrey, Hansen, Dunn & Company, 525 - 17th St., Rock Island, Illinois 61201.

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# SOFTWARE INSTRUCTOR

## *Have the Know-how AND Professional Experience? Teach at Datapoint.*

### Openings in San Antonio, Washington, D.C., and San Francisco

Datapoint Corporation, a growing leader in the computer and data processing industry, has immediate opportunities for Software Instructors at our San Antonio corporate headquarters, Washington, D.C., and San Francisco.

Requirements for this position include a bachelor's degree (or the equivalent in experience) and a minimum of 4 years of programming and system analysis training in a business environment, with experience in higher level and assembler languages. Familiarity with COBOL, RPG and DATABUS is desirable, as are experience in telecommunications and data processing instruction.

Datapoint provides excellent income and fringe benefits in addition to the potential for career development.

*FOR IMMEDIATE ATTENTION, JUST SEND YOUR RESUME IN FULL CONFIDENCE TO:*

Mr. John Ross
Datapoint Corporation
Data Processing Division
9725 Datapoint Drive
Mail Station M-84
San Antonio, Texas 78284

DATAPOINT CORPORATION

The leader in dispersed data processing™

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**FPL**
FLORIDA POWER & LIGHT COMPANY

# SYSTEMS PERFORMANCE ANALYST

Florida Power & Light Company has an immediate opening in the Computer Operations Department in Miami.

Candidates must have a minimum of three years systems programming experience in a medium or large IBM Systems environment. VS2 experience preferred. Bachelor's Degree in Statistics, Mathematics or Computer Sciences desired. Operating, Customer Engineering and/or Systems Analysis background is also helpful.

As one of the most progressive electric utilities in the nation we offer an excellent benefit package, career opportunities in a professional environment and competitive salaries commensurate to qualifications.

Qualified candidates should submit resumes including salary history in strict confidence to:

Mr. A.M. Strickland
Florida Power & Light Company
P.O. Box 529100
Miami, Florida 33152

AN EQUAL OPPORTUNITY EMPLOYER M/F

# DATA PROCESSING PROFESSIONALS TAKE THE BULL BY THE HORNS. WE DID.

A revolutionary concept. Aggressive marketing. Far-sighted management. Strong, progressive information systems. With these weapons, Iowa Beef rose to unquestioned leadership in the beef industry . . . and is aiming for even greater success. Right now, we're looking for creative, ambitious Data Processing professionals who can capitalize on the unlimited potential of the future and grow with us in these positions:

## PROGRAMMER ANALYSTS

The qualified candidate possesses a minimum of 2 years COBOL programming experience and at least 1 year in systems design including team leadership responsibility for major system development.

## PROGRAMMERS

A minimum of 2 years COBOL experience on large scale hardware, will qualify you for this challenging, growth-oriented position.

We offer an excellent salary and full benefits including profit sharing and cash bonus. So if you're ready to take the bull by the horns, come to Iowa Beef-where your skills are challenged and your achievements recognized. Send your detailed resume with salary history and requirements, in strictest confidence, to: Walt Meciag, Manager Professional Employmet, IOWA BEEF PROCESSORS, INC., P.O. Box 3350, Sioux City, Iowa 51101.

OR CALL COLLECT
(402) 494-2061

**ibp IOWA BEEF PROCESSORS, INC.**
*An Equal Opportunity Employer M/F*

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# HELP!!!

A Major Data Center located in Central Florida seeks programmers, Programmer/Analyst's, and Systams Analysts to function as consultants to their national and international clients. The following are mandatory requirements:

## 1) ANS COBOL
## 2) OS and/or DOS JCL
## 3) Willing to travel extensively

The company pays all fees, including interviewing and relocation, additionally, they offer excellent benefits, in-house career progression, and salaries in the $14-24K range. Please call me collect (904) 398-7371 if you are interested in this axcellant opportunity.

Contact Bill Denny, V.P.
**Jim King and Associates**
43B Gulf Life Tower/Jacksonville, Florida 32207
(904) 398-7371

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# FACULTY POSITION

**COMPUTER SCIENCE AND MATHEMATICS:** Assistant professor; tenure track. Teaching undergraduate mathematics and computer science with strong background in computer science required. Doctorate preferred. Salary range $9,000-$13,000 depending on qualifications. Starting date August, 1978. Send resume, transcripts, and references by July 30 to Dr. Charles Turney, Vice President for Academic Affairs, Catawba College, Salisbury, North Carolina, 28144. *Affirmative Action. Equal Opportunity Employer.*

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# COBOL PROGRAMMER

Division of large Atlanta based broadcasting corporation has an immediate opening for an individual to work on interesting applications. Minimum 3 years experience. Must have some experience on 370/DOS, ANS structured COBOL, VSAM/CICS. Send resume and salary history to **Cox Data Services, 5600 Roswell Road, Prado/North, Suite 100, Atlanta, GA 30342. An Equal Opportunity Employer M/F.**

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# INSURANCE SYSTEMS

Jack Edwards Associates specialize exclusively in insurance data processing. We deal with a select number of highly professional companies who are looking for the best people available. Your career is reviewed and opportunities discussed on a one to one basis.

Current openings at several locations include:

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| Project Manager<br>Life Ins. Package Installation | $28,000 |
| Sr. Sys Engineer<br>Life, Ordinary or Group ALC/COBOL | $24,000 |
| Project Leader<br>CASUALTY, COBOL, New England | $28,000 |

If you are in the insurance field, we'd like to hear from you.

*Jack Edwards Associates*
*Suite 600*
*8150 Leesburg Pike*
*Vienna, Virginia 22180*
*(703) 821-0688*
*Insurance Personnel*

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# MANAGER OF SYSTEMS ASSURANCE

Ryder Truck Rental, world's largest truck rental and leasing corporation, is currently accepting applications for manager of systems assurance primary responsibilities will include:

- Overall quality control for major MIS organization.
- Change Control - including applications, operating systems, and equipment.
- Testing and production certification.

The successful candidate must have a bachelor's degree or equivalent training, a proven track record of management skills, a minimum of 10 years large system IBM experience in addition to:

- Working knowledge of IMS.
- Experience with system development methodologies.
- Systems assurance or quality control experience.
- Testing and certification.

If you feel you possess the background to join a successful professional team and desire an atmosphere of challenge in a growing MIS operation, please send your resume with salary history to:

Barbara Edwards
Personnel Manager, MIS
Ryder Truck Rental, Inc.
2850 Tigertail Avenue
Coconut Grove, FL 33133
*Equal Opportunity Employer M/F*

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# COMPUTER PROFESSIONALS

## ANALYST-PROGRAMMERS -MARKETING REPRESENTATIVES

COBOL or IBM 370 ASSEMBLER experience required. Marketing Representative should be experienced in software package sales. Send Resume to:

General Computer Services, Inc.
P.O. Box 5148
Huntsville, AL 35805
(205) 539-9492

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# Data Processing Instructor

Position available September 16, 1978. B.S. in data processing or allied field, two years' experience, ability to program in three languages required. Applications accepted to July 31, 1978: Contact Dr. William F. Snyder, Wytheville Community College, 1000 East Main St., Wytheville, VA 24382. An Equal Opportunity/Affirmative Action Institution.

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# MINI-COMPUTER SALES

Outstanding opportunity for highly motivated computer marketers. Mini-computer hardware knowledge and experience in business applications required. You will represent C.D. Systems in marketing the powerful Honeywell Level/6 family of mini's.

Contact:
Mr. Tom Morrison
C.D. SYSTEMS
7905 "L" Street
Omaha, NE 68127
(402) 339-7565

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# WISCONSIN

If the good life is important to you, move your data processing skills to Wisconsin. In the midst of trees, lakes, fresh air, you will find professional data processing departments needing you and offering you opportunity to further your career. Backgrounds and experience of every kind are needed. Let me help you in a SELECTIVE, CONFIDENTIAL search. Call LEOTA ESTER, Northeast Wisconsin's Data Processing Specialist for the past 6 years, (414) 731-5221. Send resume to:

**MANAGEMENT RECRUITERS**
**228 N. Richmond St., Suite 202**
**Appleton, Wis. 54911**

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# SOUTHEAST JOB FEAST

Want out of the cold winters into the sunny Southeast? We have immediate openings with the most progressive clients in the Southeast & nationally for Systems Analysts & Programmers. Salary ranges to $30K. If interested send resume or call Continental Personnel, Inc., P.O. Box 11321, Charlotte, NC 28209 (704) 525-2160.

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# IRAN

The Oil Service Company of Iran (OSCO) has been established by a Consortium of major international oil companies and operates in South Iran on behalf of the National Iranian Oil Company. Already one of the largest oil and gas producers in the world, it is substantially expanding its capacity.

Challenging opportunities are available in the OSCO information and Computer organization for:

## TECHNICAL AND COMMERCIAL SYSTEMS ANALYSTS/PROGRAMMERS

at several levels of seniority, including project leaders.

Candidates should have a university degree in Computer Science or equivalent and, at the junior level, a minimum of four years experience in active programming and systems analysis.

- Excellent Benefits
- Family Status
- American Type School, K-12
- Tax Protection
- Annual Vacation

If interested, please send resume to:

**OVERSEAS RECRUITMENT DEPARTMENT**
**ASIATIC PETROLEUM CORPORATION**
One Rockefeller Plaza, New York, N.Y. 10020

Asiatic Petroleum Corporation, a wholly owned subsidiary of the Royal Dutch/Shell Group, provides recruitment services under contract to OSCO, Iran.

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# Technical Review Analyst

GTE Automatic Electric, a progressive telecommunications manufacturing firm with one of the largest IBM computer installations in the Chicagoland area, needs a DP specialist to help ensure the quality of applications being developed.

If you have at least a bachelor's degree...a minimum of 6 years IBM/MVS, MVT experience..."state-of-the-art" knowledge of systems tools, techniques and hardware... solid communicative skills...and if you are familiar with development and administration of standards...

## ADVANCE YOUR CAREER

Dental, medical and life insurance, stock and investment plans highlight our attractive benefits package. Competitive compensation commensurate with your experience and knowledge.

Send your resume, including salary data, to:

G. M. Protos
Senior Professional Recruiter

**GTE AUTOMATIC ELECTRIC**
*"Innovators in Electronics".*
400 N. Wolf Road
Northlake, Illinois 60164
*An Equal Opportunity Employer M/F*

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# SCIENTIFIC PROGRAMMER ANALYST

## Pharmaceutical Research

We are adding another position to our research support staff. If you seek a career opportunity, this opening is worth serious consideration.

It requires a detailed knowledge of FORTRAN or PL1. Candidates should also have one or more of the following:

- INQUIRE experience
- COBOL
- Knowledge of techniques in statistical analysis
- Previous experience in a clinical or laboratory environment

Experience level should be a minimum of 2 years. A degree in Computar Science or Math required.

In addition to the opportunity this position offers to participate in medical research, you will find the benefits attractive in our suburban location easily accessible by highway or public transportation.

Resume should be sent to: Manager, Research Employment, Schering-Plough Research Center, 60 Orange Street, Bloomfield, New Jersey 07003.

**Schering-Plough**
We Are An Equal Opportunity Employer M/F

# DIRECTOR
# INFORMATION SYSTEMS

Rapidly growing NYSE company, headquartered in St. Louis is seeking an outstanding individual to head its DP organization.

The successful candidate will be a "DOER" who possesses excellent management and communication skills, relates well with all levels of management and can identify with corporate goals and participate in the planning thereof.

He or she will have implemented complex systems in a large terminal-based environment and will direct the further planning and implementation of cost effective systems to meet rapidly increasing needs.

This position, which reports to the vice president of finance offers excellent compensation and growth opportunities. For consideration, send a detailed resume and salary history in confidence to: Manager, Personnel Administration, Box 14434, St. Louis, MO 63178.

*An equal opportunity employer*

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## Specialist
## Mini Configurations
## $33,000 Range

Software/Hardware Selection

For Confidential Consideration Forward Resume With Present Salary.

**Exeter Associates, Inc.**
EXECUTIVE RECRUITING CONSULTANTS
BOX 623. COMPUTER PARK HAMPTON N H 03842

BRUCE A. MONTVILLE
MANAGING PARTNER
(603) 926-6712

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# APPLICATION PROGRAMMERS

Husky Oil, a fully integrated, independent oil company, has new growth opportunities in its Cody, Wyoming offices for Application Programmers with 2-5 years experience.

We are expanding our information systems network and are looking for talented, capable people with OS VS or related IBM backgrounds.

If you are a COBOL programmer and wish to join a dynamic team in a challenging environment, please send your resume and salary history to: C.E. Hall, Manager, Employee Relations.

**Husky Oil Company**
**P.O. Box 380**
**Cody, Wyoming 82414**

Husky

Equal Opportunity Employer M/F

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# SYSTEMS ANALYST, PROGRAMMER ANALYST

Would you like to join the most exciting energy firm in the Northwest today? We are a major utility agency with work in progress on $7 billion worth of nuclear power plants. We are seeking Systems Analysts and Programmer Analysts with business applications experience for a permanent position on our professional staff.

Requirements for Systems Analyst include a degree, plus a minimum of three years of directly related professional level experience.

Programmer Analyst positions require a degree, plus one year of programming experience, or three years of responsible professional level experience.

Starting salary commensurate with experience.

Send resume, salary history, and salary requirements in confidence to:

B.E. LINVILLE
DEPT. GJK - 100
**Washington Public**
**Power Supply System**
P.O. Box 968
Richland, WA 99352

an affirmative action employer

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# PROJECT LEADER HOUSTON, TEXAS

Division of U.S. Home, nation's largest homebuilder, needs Project Leader, to lead the development of on-line applications, RPG, CCP, and COBOL desirable; accounting experience, degree preferred.

Excellent benefits, growth opportunity, pleasant working atmosphere. Salary open. Please send confidential resume to:

**U.S. HOME CORP.**
13600 Murphy Rd.
Stafford, TX 77477
*Equal Opportunity Employer*

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# DATA PROCESSING SUPERVISOR
## TOWN OF WELLESLEY

The Town of Wellesley seeks a person to be responsible for the planning, organization and effective administration of its Data Processing. The person should have experience in conducting feasibility studies, systems design and programming. Knowledge of RPG and COBOL helpful. The Town presently has a Honeywell 2020 System and is conducting a study which may lead to on line systems. Salary commensurate with qualifications and experience. Qualified applicants may send resume to Personnel Department, Town Hall, 525 Washington Street, Wellesley, MA 02181, or call 235-5561 for further information.

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## SYSTEMS PROGRAMMER

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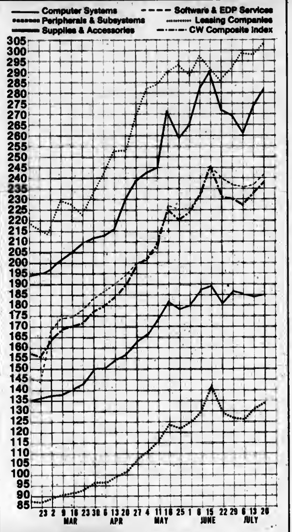

# Earnings Reports

**DOCUMATION**
Three Months Ended April 28

| | 1978 | 1977 |
|---|---|---|
| Shr Ernd | $.40 | $.20 |
| Revenue | 11,117,000 | 8,283,000 |
| Earnings | 1,168,000 | 591,000 |

**MCI COMMUNICATIONS**
Year Ended March 31

| | 1978 | 1977 |
|---|---|---|
| Shr Ernd | $.23 | ... |
| Revenue | 74,049,000 | $62,759,000 |
| Spec Cred | a2,690,000 | b2,018,000 |
| Earnings | 8,190,000 | 348,000 |
| 3 Mo Shr | .03 | .02 |
| Revenue | 19,538,000 | 17,270,000 |
| Spec Cred | a368,000 | .... |
| Earnings | 637,000 | 615,000 |

a-From tax-loss carryforward. b-Gain on acquisition of a subsidary's debentures.

**QUANTOR**
Three Months Ended April 20

| | 1978 | 1977 |
|---|---|---|
| Shr Ernd | ... | $.15 |
| Revenue | $5,373,000 | 5,948,000 |
| Earnings | (1,779,000) | 346,000 |
| 9 Mo Shr | ... | .43 |
| Revenue | 15,524,000 | 16,293,000 |
| Spec Cred | .. | a486,000 |
| Earnings | (1,578,000) | 1,033,000 |

a-Tax-loss carry forward.

**UDS**
Three Months Ended April 29

| | 1978 | 1977 |
|---|---|---|
| Shr Ernd | $.20 | $.02 |
| Revenue | 1,761,000 | 906,000 |
| Loss Disc Op | ... | 64,000 |
| Earnings | 186,000 | 67,000 |

**WYLY**
Three Months Ended March 31

| | 1978 | 1977 |
|---|---|---|
| Shr Ernd | a$12.32 | ... |
| Revenue | 17,655,000 | 16,801,000 |
| Loss | 952,000 | $1,020,000 |
| Spec Cred | b72,761,000 | .. |
| Earnings | 71,809,000 | (1,020,000) |

a-Reflects a one-for-four reverse stock split in Feb. 1978.
b-Represents swap of outstanding debt for a combination of cash and stock in a recapitalization effective Feb. 24, 1978.

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# Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JULY 19, 1978

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

| EACN | | 1978 NANGE (1) | PNICE CLDSE JUL 19 1978 | WEEA NET CHNGE | WEEA ACT CHNGE |
|---|---|---|---|---|---|
| | CONAUTEN SYSTENS. | | | | |
| A | ANDAHL COAP | 28- 56 | 38 5/8 | +1 7/8 | +3.1 |
| N | BURAOUGNS COAP | 59- 80 | 74 1/2 | +1 1/4 | +1.7 |
| O | COMPUTEA AUTONATION | 23- 58 | 33 5/4 | + 1/4 | +0.7 |
| N | CONTROL OATA CORA | 23- 37 | 37 | +3 | +8.8 |
| O | CRAY AESEANCH INC | 21- 48 | 44 1/2 | +2 | +4.7 |
| N | OATA GENEAAL COAA | 42- 61 | 39 5/8 | +1 7/8 | +5.2 |
| N | OATAAOINT CORP | 34- 64 | 56 5/4 | -2 1/2 | -4.2 |
| N | OIGITAL EOUIPNENT | 59- 33 | 46 5/8 | + 3/4 | +1.6 |
| N | ELECTAONIC ASSOC. | 2- 8 | 6 1/2 | - 1/8 | -1.8 |
| A | ELECTAONIC ENGINEER. | 12- 19 | 16 5/4 | -1 3/8 | -7.8 |
| O | FOUN-PHASE SYSTENS | 19- 53 | 32 1/4 | +1 1/2 | +4.8 |
| N | FOXBORO | 28- 40 | 38 5/8 | +1 1/2 | +4.0 |
| O | GENEAAL AUTONATION | 7- 20 | 18 7/8 | + 7/8 | +4.8 |
| O | GAI CONAUTEA CORA | 1- 1 | 1 3/8 | 0 | 0.0 |
| N | NEWLETT-PACAANO CO | 62- 85 | 84 3/4 | +2 3/8 | +2.8 |
| N | NONEYNELL INC | 45- 63 | 63 | +6 | +10.5 |
| N | IBN | 236-274 | 269 3/4 | +11 5/8 | +4.4 |
| O | NANAGEMENT ASSIST | 9- 18 | 17 1/2 | +1 1/4 | +7.6 |
| O | NICAOOATA CORP | 10- 17 | 16 1/4 | + 1/4 | +1.8 |
| O | NINI-CONAUTEN SYST | 9- 8 | 3 | - 1/4 | -4.7 |
| O | MODULAA CONAUTEN SYS | 7- 13 | 15 1/2 | +1 | +8.0 |
| N | NCR | 57- 58 | 36 3/4 | +2 7/8 | +5.5 |
| O | PNINE COMPUTEN INC | 20- 39 | 28 | + 1/4 | +0.9 |
| N | PFNRIN-ELNEA | 17- 26 | 23 1/2 | +1 7/8 | +7.8 |
| N | HAYTNEON CO | 29- 31 | 51 | 0 | 0.0 |
| N | SAERRY NANO | 33- 45 | 42 3/4 | +1 1/4 | +5.0 |
| A | SYSTENS ENG. LABS | 11- 21 | 18 1/8 | +1 5/8 | +8.2 |
| A | NANG LABS. | 12- 26 | 25 7/8 | +1 3/8 | +6.1 |
| | LEASING COMPANIES | | | | |
| O | ALANTNUS CORP | 3- 6 | 5 5/4 | 0 | 0.0 |
| O | BOOTNE COUAIEN COAP | 13- 18 | 15 3/8 | + 1/4 | +1.6 |
| O | CONDISCO INC | 9- 20 | 18 1/2 | +1 1/2 | +8.8 |
| A | CONNENCE GNOUP CONA | 1- 1 | 3/8 | 0 | 0.0 |
| A | CONPUTEA ENVSTNS GRP | 1- 1 | 7/8 | 0 | 0.0 |
| N | OATAONIC AENTAL | 1- 2 | 1 1/2 | 0 | 0.0 |
| A | OCL INC | 3- 4 | 5 5/4 | - 1/8 | -3.2 |
| N | OAE INC | 8- 15 | 12 1/8 | +1 | +8.9 |
| N | ITEL | 16- 27 | 23 1/2 | +1 1/2 | +6.2 |
| N | LEASCO CONA | 24- 35 | 32 1/4 | + 1/4 | +0.7 |
| O | LEASAAC COAA | 1- 4 | 5 | 0 | 0.0 |
| A | AIONEEA TEX CONA | 5- 7 | 8 5/8 | - 1/8 | -2.1 |
| N | U.S. LEASING | 13- 17 | 18 7/8 | + 1/4 | +1.5 |

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EACN: N=NEN YORA; A=ANENICAN; P=AHIL-BALT-WASN
L=NATIONAL; N=NIOWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BIO AAICES AS OF 3 A.M. OA LAST BIO
(1) TO NEAAEST DOLLAN

| ENCN | | 1978 RANGE (1) | PAICE CLOSE JUL 19 1978 | WEEN NET CHNGE | WEEA PCT CHNGE |
|---|---|---|---|---|---|
| | SOETNANE & EOP SENVICES | | | | |
| O | AOVANCEO CONA TECN | 1- 2 | 1 1/4 | + 1/4 | +23.0 |
| O | ANACONP INC | 8- 20 | 16 7/8 | 0 | 0.0 |
| A | APPLIED OATA AES. | 8- 16 | 14 5/4 | + 5/8 | +4.4 |
| N | AUTONATIC OATA PNOC | 24- 54 | 50 7/8 | 0 | 0.0 |
| O | COLENAN ANERICAN COS | 1- 2 | 1 7/8 | 0 | 0.0 |
| O | CONPU-SEAV NETWORR | 7- 12 | 7 1/2 | -1 1/4 | -14.2 |
| O | CONA ELECTION SYSTNS | 9- 10 | 9 | - 1/4 | -2.7 |
| O | CONPUTER NOAIZONS | 1- 5 | 6 | 0 | 0.0 |
| O | CONPUTEA NETWOAR | 8- 12 | 11 1/4 | + 3/8 | +3.4 |
| N | CONPUTER SCIENCES | 8- 13 | 11 3/4 | + 3/8 | +3.6 |
| O | CONPUTEA TASA GROUP | 1- 4 | 5 | 0 | 0.0 |
| O | CONPUTEN USAGE | 2- 4 | 2 5/8 | 0 | 0.0 |
| O | CONSHARE | 6- 17 | 13 1/4 | +1 | +7.0 |
| O | DBTA OINENSIONS INC | 4- 7 | 3 1/2 | 0 | 0.0 |
| O | DATATAB | 1- 2 | 7/S | 0 | 0.0 |
| N | ELECTAONIC OATA SYS. | 15- 23 | 19 7/8 | +1 | +5.2 |
| O | INSYTE COAA | 1- 2 | 2 | + 1/4 | +14.2 |
| C | IAS CONPUTEA NARNET. | 2- 5 | 3 | 0 | 0.0 |
| O | REANE ASSOCIATES | 3- 6 | 5 3/8 | + 1/8 | +2.2 |
| O | REYDATA COAP | 1- 3 | 2 | - 1/4 | -11.1 |
| A | LOGICON | 11- 13 | 12 5/8 | + 3/8 | +5.0 |
| A | NANAGENENT OATA | 1- 1 | 7/8 | - 1/8 | -12.5 |
| A | NATIONAL CSS INC | 15- 28 | 25 1/4 | + 7/8 | +3.8 |
| O | NATIONAL OATA CONP | 7- 12 | 11 3/4 | +1 5/4 | +17.5 |
| A | ON LINE SYSTENS INC | 17- 26 | 23 1/2 | + 5/8 | +1.6 |
| N | PLANNING AESEAACH | 4- 8 | 6 7/8 | - 1/8 | -1.7 |
| O | ANDGRAPNING & SYS | 1- 1 | 3/4 | 0 | 0.0 |
| O | AAAIOATA INC | 3- 6 | 5 1/2 | + 1/2 | +10.0 |
| O | REYNOLOS & NEYNOLO | 18- 28 | 26 1/2 | 0 | 0.0 |
| O | SCIENTIFIC CONPUTENS | 3- 6 | 4 3/4 | - 1/4 | -5.0 |
| O | TYNSHAAE INC | 18- 27 | 25 1/2 | + 3/8 | +1.4 |
| A | URS SYSTENS | 5- 7 | 7 | + 1/8 | +1.8 |
| N | WYLY CORA | 1- 3 | 4 | 0 | 0.0 |
| | PEAIAHENALS & SUBSYSTENS | | | | |
| N | ADDAESSOGNAPH-NULT | 14- 23 | 23 | +1 1/4 | +5.7 |
| O | ADVANCEO NENORY SYS | 7- 14 | 15 | + 1/4 | +1.9 |
| N | ANPEA CORP | 10- 17 | 14 7/8 | + 1/2 | +5.4 |
| O | ANOERSON JACOBSON | 5- 8 | 8 | + 1/8 | +1.8 |
| N | AAALIEO OIG OATA SYS | 13- 18 | 14 7/8 | + 1/2 | +3.4 |
| O | BEENIVE INT'L | 4- 7 | 3 7/8 | +1 1/8 | +23.6 |
| A | BOLT.BERANEK & NEN | 6- 11 | 8 5/8 | + 1/2 | +6.3 |
| N | BUNKEA-AAMO | 10- 18 | 13 3/4 | - 1/8 | -0.7 |
| A | CALCOMP | 5- 9 | 7 7/8 | - 3/8 | -4.5 |
| O | CAMBAIDGE NEMONIES | 3- 8 | 3 1/2 | - 1/4 | -4.3 |
| N | CENTRONICS OATA COMP | 16- 29 | 28 1/8 | + 8/8 | +2.2 |
| O | COGNITAONICS | 1- 4 | 3 | 0 | 0.0 |
| O | CONPUTEA CONNUN. | 6- 10 | 7 5/4 | + 1/8 | +1.6 |
| O | COMPUTEA CONSOLES | 4- 8 | 7 | 0 | 0.0 |
| A | COMPUTEA EOUIPNENT | 3- 6 | 4 1/4 | 0 | 0.0 |
| O | CONPUTEN TRANSCEIVEA | 1- 2 | 1 1/2 | - 1/8 | -7.6 |
| O | CONTEN | 9- 28 | 25 3/8 | +1 1/4 | +5.1 |
| N | CONRAC CONA | 19- 26 | 19 1/2 | 0 | 0.0 |

| EACN | | 1978 AANGE (1) | ARICE CLOSE JUL 19 1978 | WEEK NET CHNGE | WEEA ACT CHNGE |
|---|---|---|---|---|---|
| O | OATA ACCESS SYSTENS | 3- 5 | 4 1/2 | - 1/4 | -5.2 |
| O | BBTA 100 | 9- 20 | 19 7/8 | + 1/4 | +1.2 |
| A | DATA PRODUCTS COAP | 13- 24 | 20 5/4 | +1 1/4 | +6.4 |
| O | OATA TECHNOLOGY | 4- 4 | 4 | 0 | 0.0 |
| O | OATUM INC | 2- 5 | 4 3/8 | - 1/4 | -5.4 |
| O | OECISION OATA CONPUT | 2- 4 | 5 3/5 | 0 | 0.0 |
| O | DELTA OATA SYSTENS | 1- 1 | 3/8 | 0 | 0.0 |
| A | DOCUMATION INC | 6- 24 | 25 | +1 3/8 | +6.5 |
| O | OATARAN COPA | 6- 24 | 20 | + 1/2 | +2.8 |
| N | ELECTRONIC N & N | 4- 7 | 6 1/4 | + 1/4 | +4.1 |
| O | FABAI-TEK | 1- 2 | 1 5/8 | - | -4.5 |
| O | GENERAL CONPUTEA SYS | 1- 2 | 2 1/4 | 0 | 0.0 |
| N | NAZELTINE CORA | 10- 16 | 14 3/8 | - 1/2 | -3.3 |
| N | HAAAIS CORP | 40- 61 | 59 3/8 | +2 3/8 | +4.6 |
| O | INFOREA INC | 6- 10 | 8 1/4 | 0 | 0.0 |
| O | INFOANATION INTL INC | 8- 11 | 8 1/4 | 0 | 0.0 |
| O | INTEL CORA | 59- 62 | 61 | +2 | +3.3 |
| A | LUNDY ELECTRONICS | 4- 5 | 5 | + 1/8 | +2.3 |
| O | NSI OATA CDAP | 12- 19 | 16 7/S | +1 5/8 | +8.8 |
| N | NENONEA | 27- 49 | 40 | 0 | 0.0 |
| N | NOHANR DATA SCI | 6- 12 | 11 1/2 | + 1/2 | +4.5 |
| O | PENRIL CORA | 3- 12 | 10 1/2 | +1 7/8 | +21.7 |
| N | AERTEC CORA | 9- 14 | 10 7/S | - 3/8 | -3.5 |
| A | ANTTER INSTRUMENT | 2- 2 | 1 3/4 | 0 | 0.0 |
| O | ARECISION INST. | 2- 2 | 2 | 0 | 0.0 |
| O | QUANTOA COAA | 2- 3 | 2 5/4 | 0 | 0.0 |
| O | RECOGNITION EQUIA | 7- 12 | 10 5/8 | 0 | 0.0 |
| O | SCAN OATA | 1- 4 | 3 3/8 | + 5/8 | +13.4 |
| N | STOAAGE TECHNOLOGY | 18- 46 | 25 5/8 | +2 1/2 | +11.8 |
| O | T BAR INC | 11- 19 | 16 | - 1/4 | -1.5 |
| C | TALLY CORA. | 4- 9 | 4 3/4 | - 1/4 | -5.9 |
| A | TEC INC | 6- 10 | 9 3/8 | + 5/8 | +4.0 |
| N | TEATRONIX INC | 53- 45 | 44 | +1 3/4 | +4.1 |
| N | TELEA | 3- 7 | 3 3/8 | 0 | 0.0 |
| O | TESOBTA SYSTENS CP | 13- 20 | 17 | 0 | 0.0 |
| O | NILTEA INC | 1- 1 | 1 | + 1/8 | +14.2 |
| | SUPPLIES & ACCESSORIES | | | | |
| A | ANEAICAN BUS PRODS | 6- 4 | 8 5/4 | - 1/2 | -5.4 |
| O | BALTINORE BUS FOANS | 2- 5 | 3 3/4 | 0 | 0.0 |
| A | AARRY NRIGHT | 14- 28 | 23 1/2 | +1 1/2 | +6.2 |
| O | CYBERNATICS INC | 1- 1 | 1 5/8 | 0 | 0.0 |
| O | DUALEA PRODUCTS INC | 18- 27 | 24 1/2 | + 1/2 | +2.0 |
| N | ENNIS BUS. FORNS | 8- 17 | 15 1/2 | - 3/4 | -5.2 |
| N | SF CONAANY | 43- 60 | 88 7/8 | +2 1/8 | +3.7 |
| O | NOORE CORP LTO | 26- 34 | 53 1/4 | - 1/4 | -0.7 |
| N | NASHUA CORA | 18- 51 | 27 1/4 | +1 5/8 | +6.3 |
| O | STANDAAO REGISTER | 20- 26 | 22 | - 1/4 | -1.1 |
| A | TAB PAODUCTS CO | 8- 13 | 11 1/8 | - 3/8 | -8.5 |
| N | UAACO | 19- 27 | 24 | 0 | 0.0 |
| A | NABASN NAGNETICS | 10- 13 | 13 1/4 | 0 | 0.0 |
| N | WALLACE BUS FORNS | 18- 28 | 27 5/8 | +1 3/8 | +5.2 |

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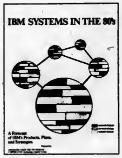
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